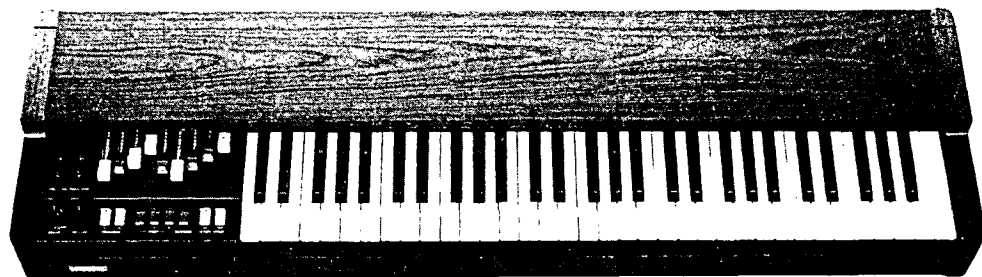


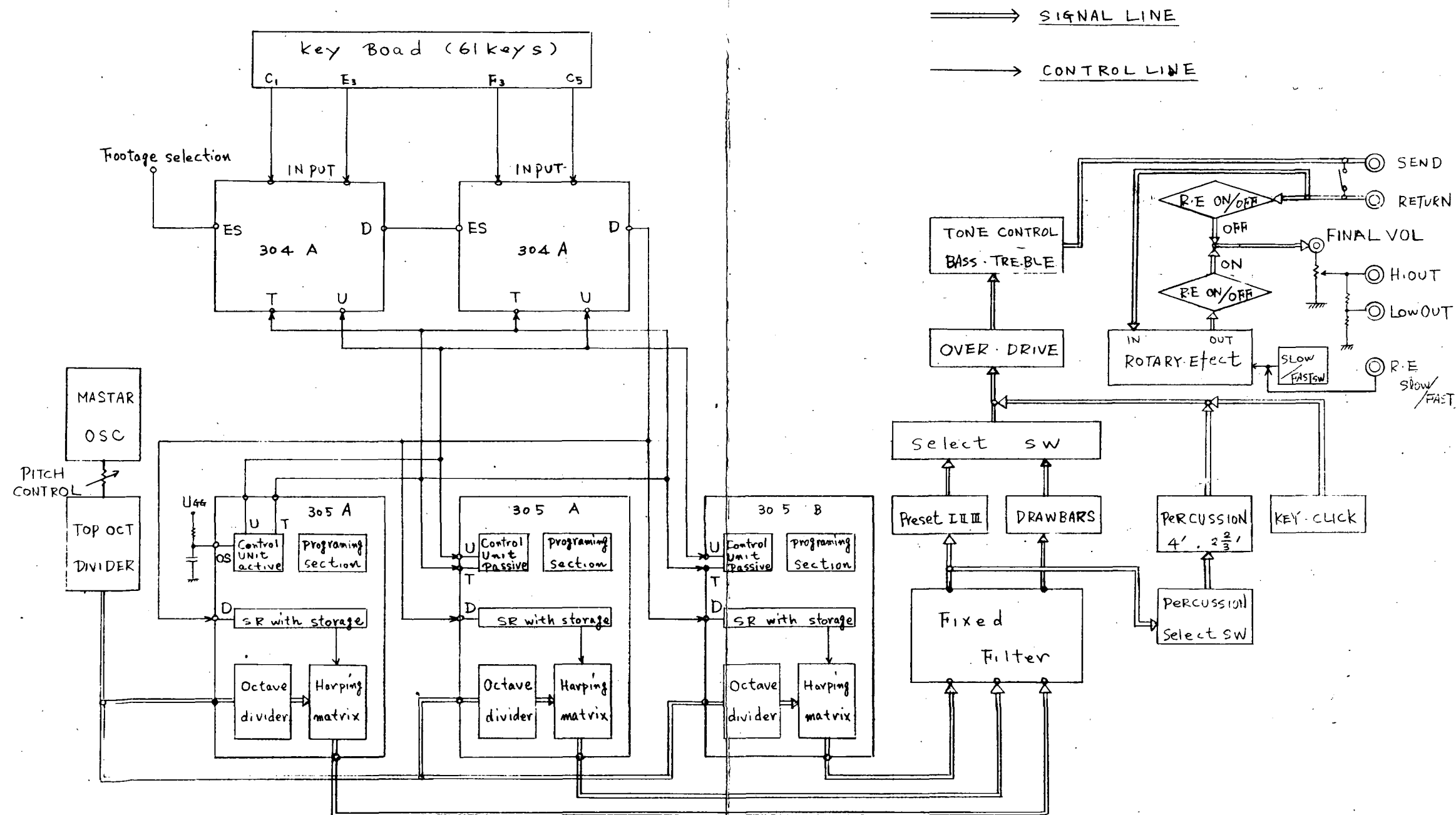
KORG CX-3

Portable Organ
Tragbare Orgel
Orgue Portatif

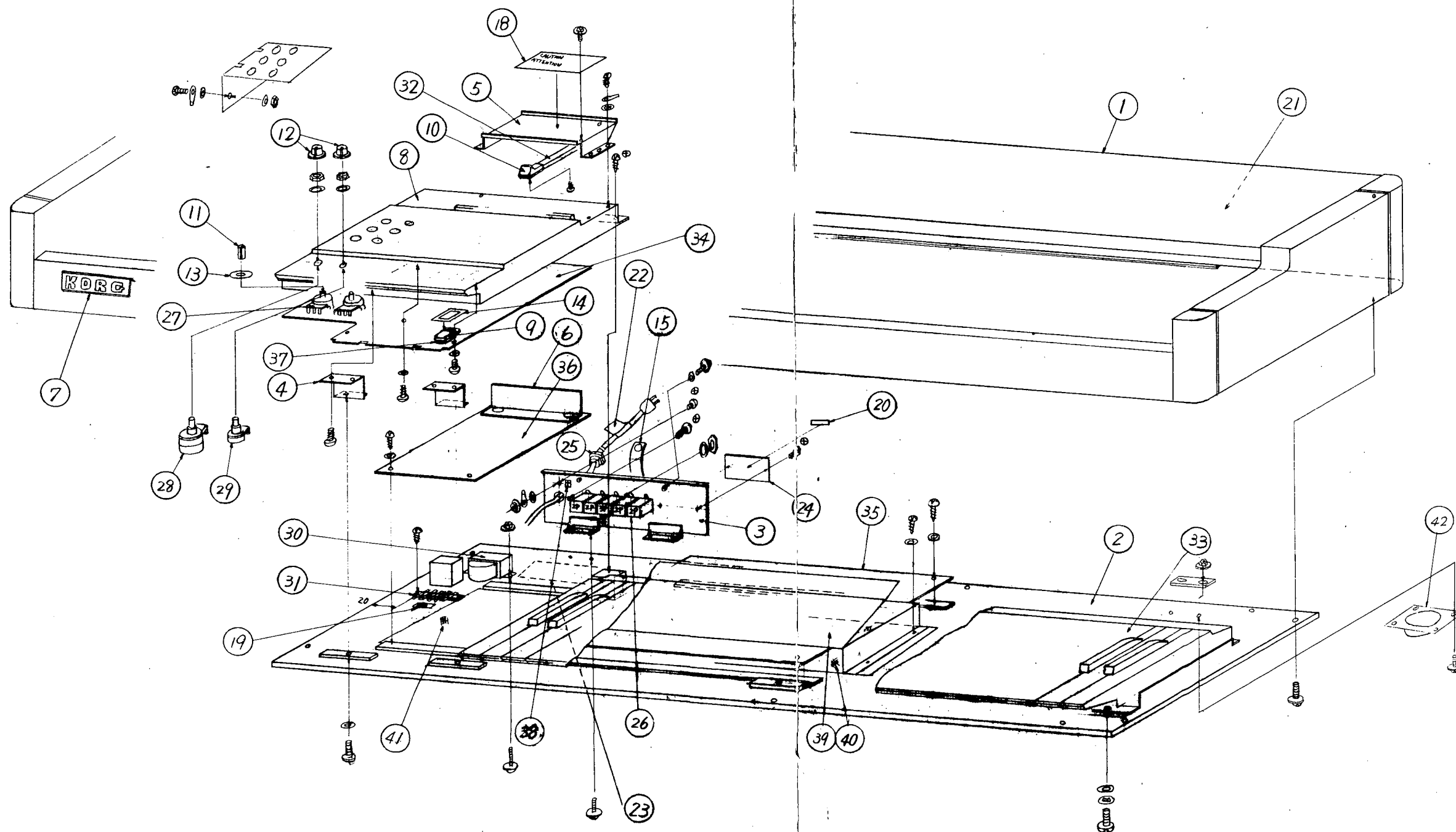


Sound
Revolution
KORG

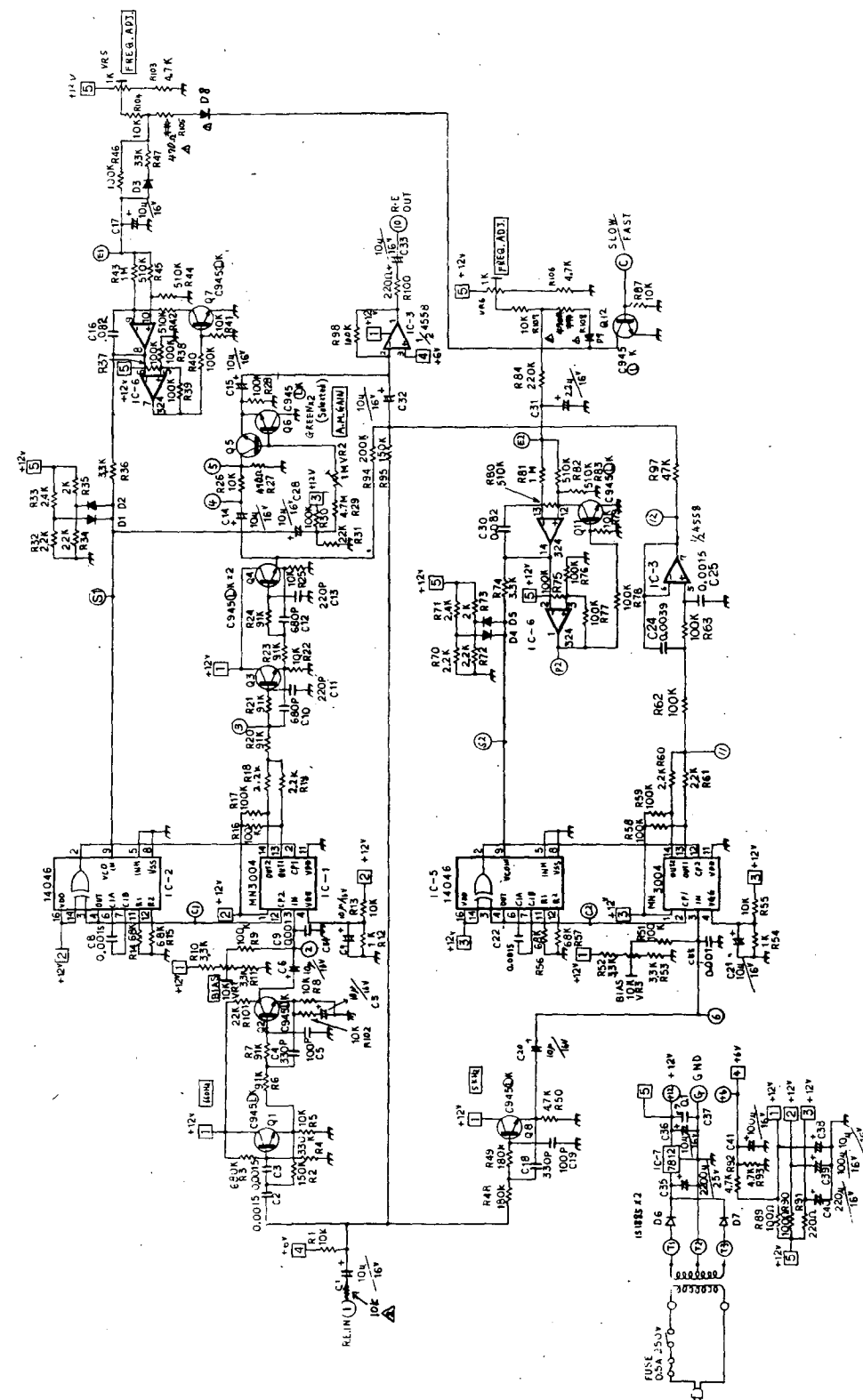
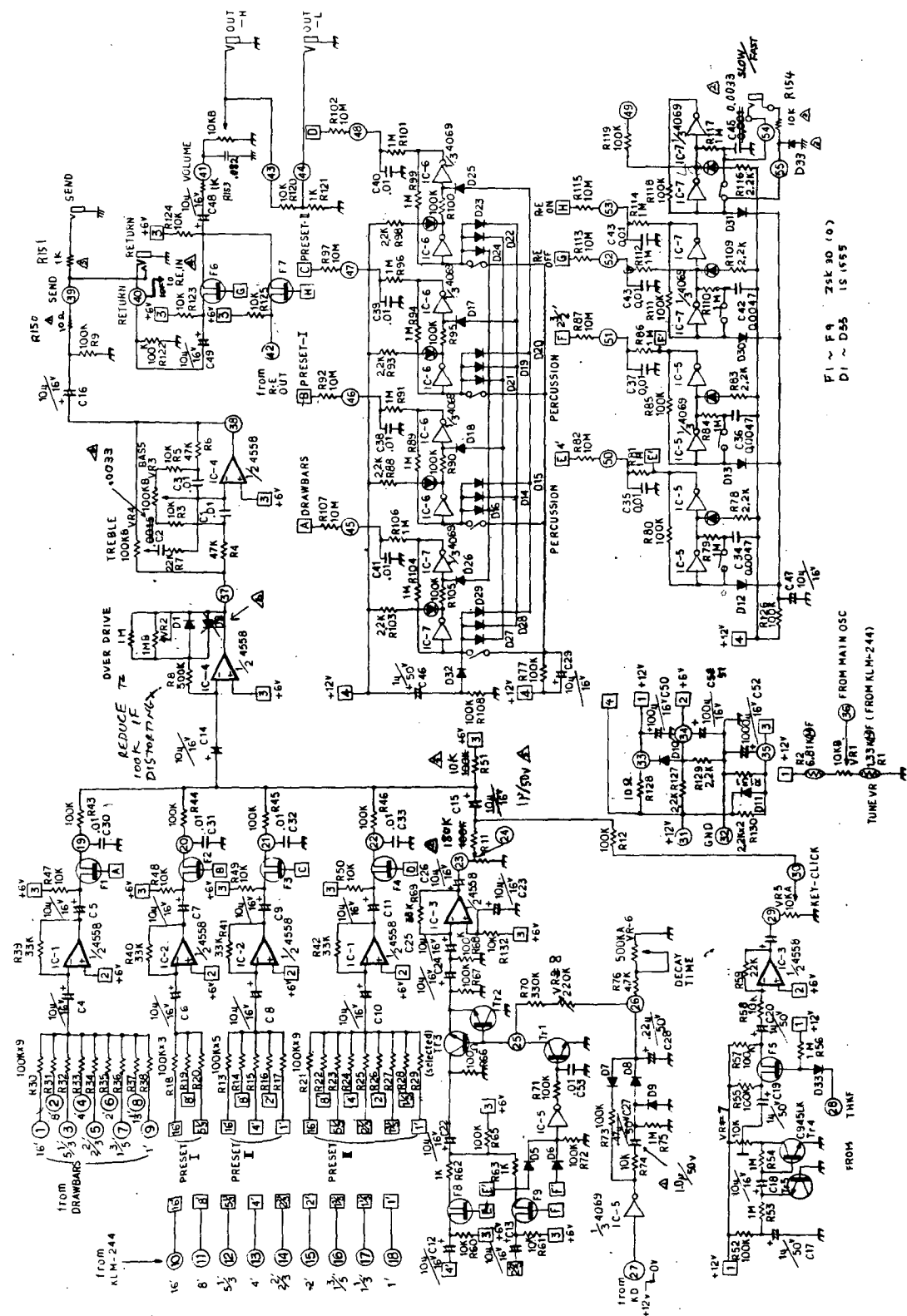
3. BLOCK DIAGRAM



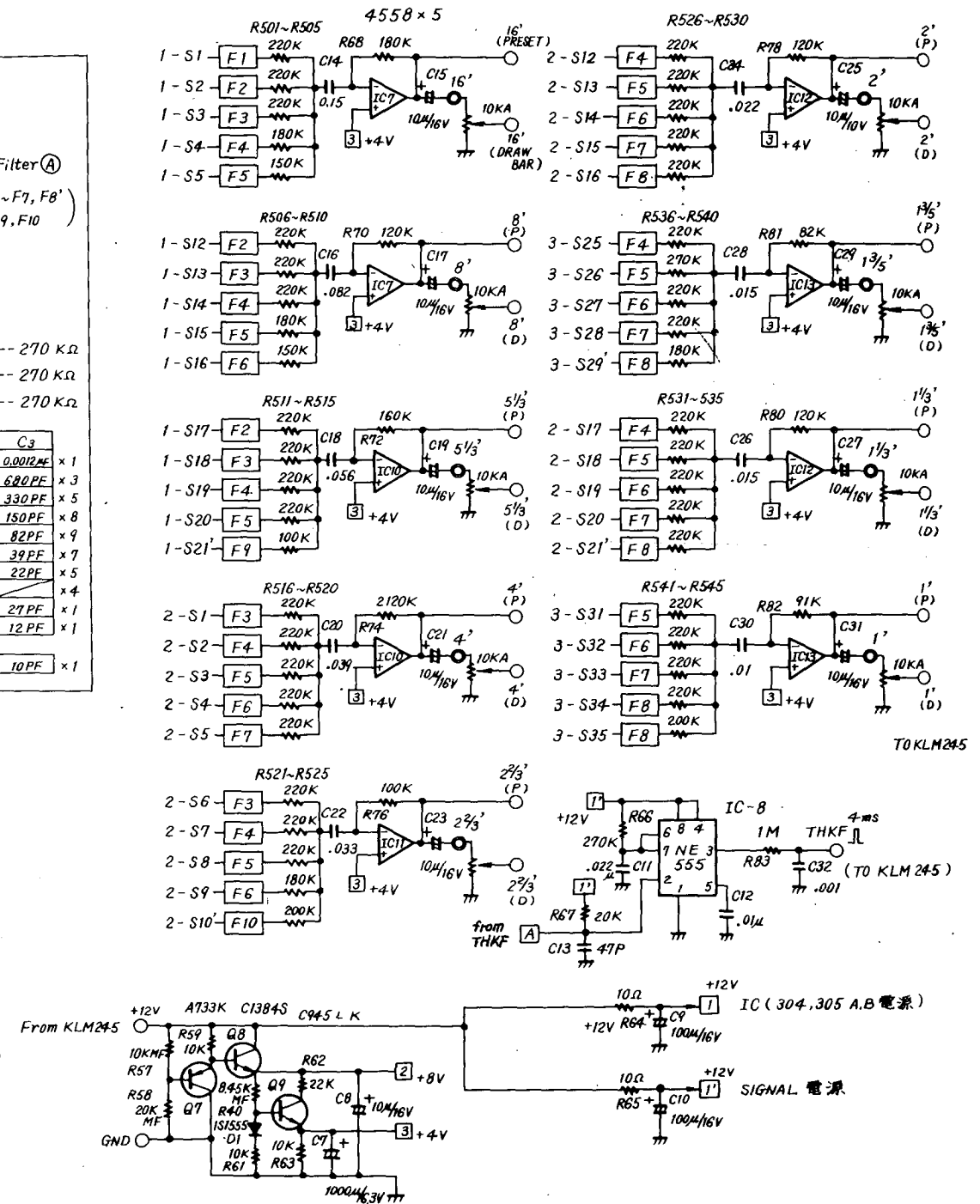
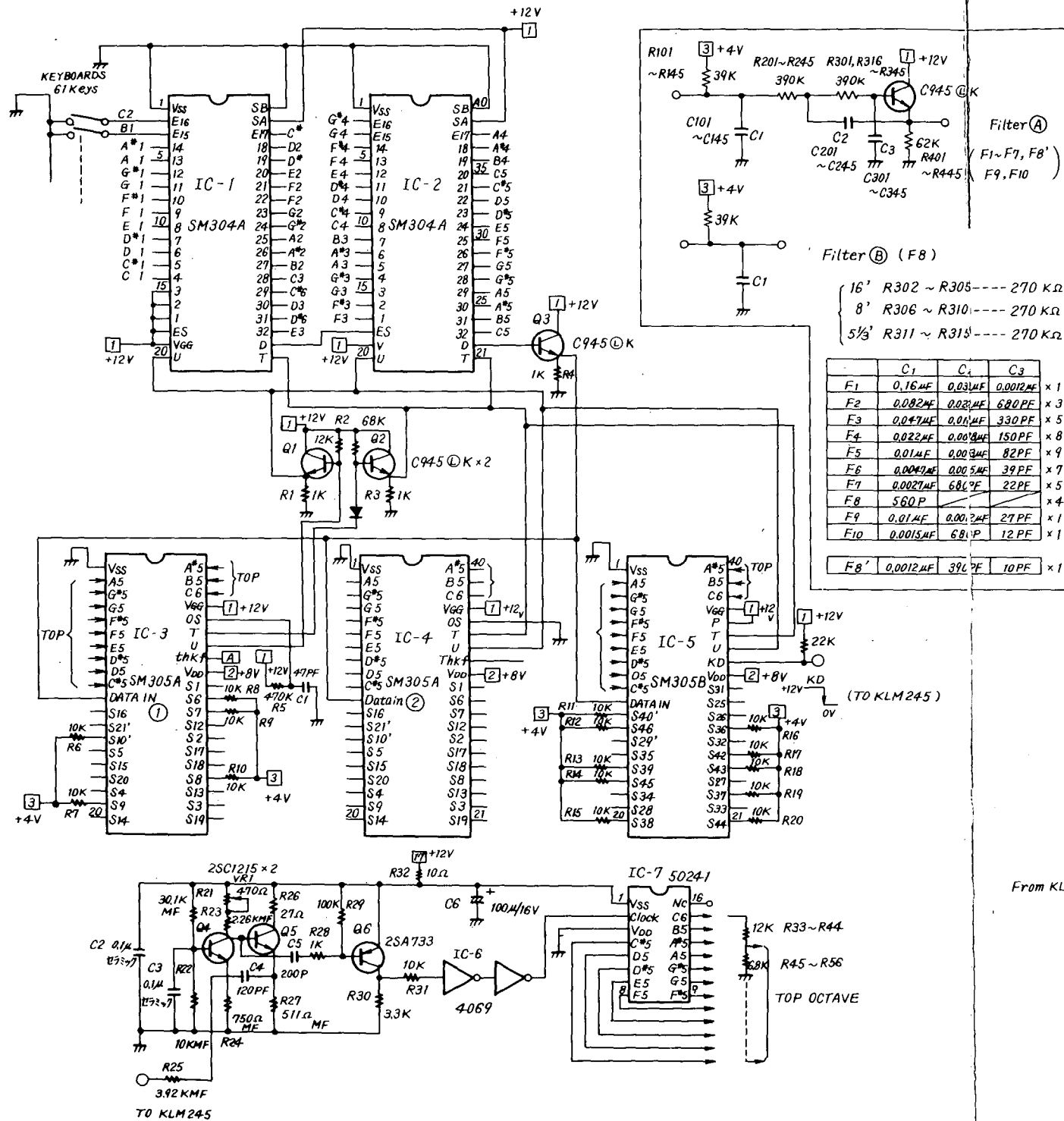
2. STRUCTURAL DIAGRAM



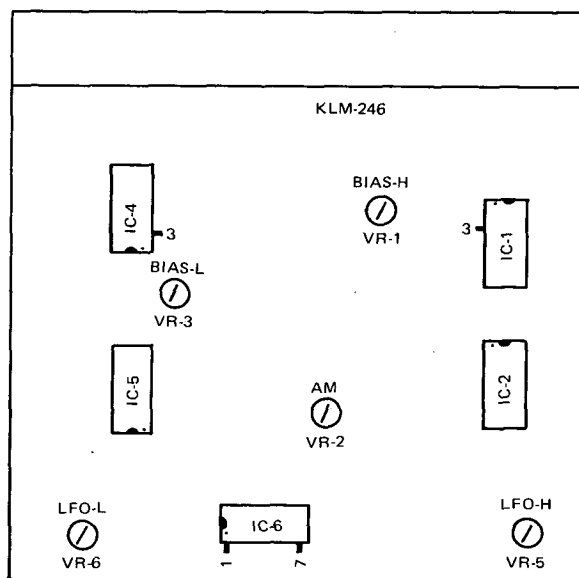
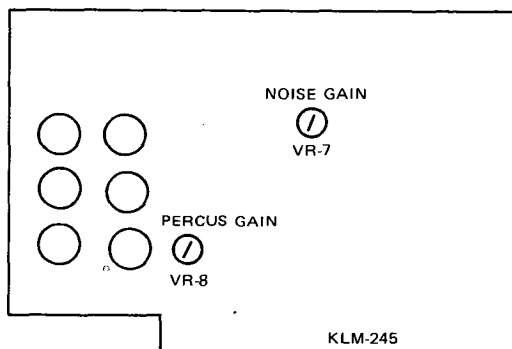
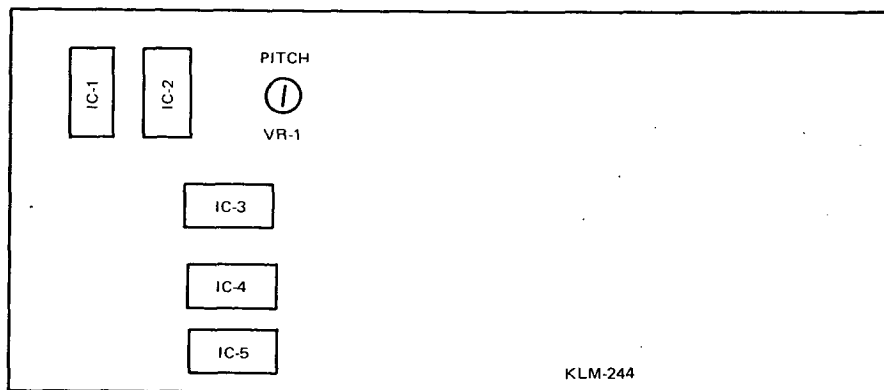
Item	Part Name	Remarks	Item	Part Name	Remarks	Item	Part Name	Remarks	Item	Part Name	Remarks
1.	Cabinet		11.	PS knob (small)		23.	Service caution seal		33.	Keyboard	
2.	Bottom		12.	Rotary knob		24.	Model number plate		34.	Control circuit board	
3.	Rear panel		13.	Lever SW mask		25.	Strain release bushing		35.	Main circuit board	
4.	Control panel mounting		14.	Selector SW mask		26.	Phone jack		36.	R.E. Circuit board	
5.	Draw bar holder		15.	Cord stopper		27.	Rotary variable resistors		37.	Selector SW	
6.	Radiation board		18.	Fuse caution seal		28.	Rotary variable resistors		38.	Earth (ground) seal	
7.	KORG Mark (Small)		19.	Fuse seal		29.	Rotary variable resistors		39.	Sealed cover	
8.	Control panel		20.	Serial number seal		30.	Power transformer		40.	Aluminum film	
9.	Selector SW knob		21.	KORG Mark seal		31.	Lug board		41.	Aluminum film	
10.	Draw bar knob		22.	Wiring caution (large)		32.	Draw bar		42.	Metal fitting of stand	



4. CIRCUIT DIAGRAM KLM-244



Trimmer positions (reference chart)



8. PARTS LIST

(Refer to structural diagram for parts list.)

PARTS NAME	SPECIFICATIONS	Q'TY	PARTS NAME	SPECIFICATIONS	Q'TY
CARBON RESISTORS (Not Listed)			CERAMIC CAPACITORS		
			561 (560 pF)		
			ECK-FIE104ZFZ (0.1 μ F)		
SOLID RESISTORS			ELECTROLYTIC CAPACITORS		
1/4W 10MrJ			0.22 μ / 50V		
			0.47		
METAL FILM RESISTORS			10 / 16		
1/4W 1.33 K μ F			100		
6.81			1000 / 6.3V		
511			220 / 16		
750			1000 / 6.3		
3.32			100 / 16		
3.92			2200 / 25		
8.45			22 / 16		
10			1 / 50		
20			10 / 16		
30.1					
2.32			TRANSISTORS		
2.26			2SC945 LK		
MYLAR CAPACITORS			2SC945		
50V 0.001 μ F k			2SC1215T		
0.0012			2SC644R		
0.0015			2SC13849		
0.0022			2SA733AK		
0.0027			FET		
0.0033			2SK30		
0.0039			DIODES		
0.0047			1S1555		
0.0068			1S1885		
0.01			IC		
0.012			SM-304A		
0.022			SM-305A		
0.033			SM-305B		
0.047			NE-555		
0.068			S-50241		
0.082			MC-14069		
0.16			4458		
0.056			MC-14046		
0.15			MN-3004		
0.015			μ PC 324		
0.039			14312 (7812)		
STYROL CAPACITORS			SEMI-FIXED RESISTORS		
47 pF G (5%)			470 Ω B H1051A		
120 (1%)			150		
CERAMIC CAPACITORS			10KB		
ECK-D1H100 Dc (10 pF)			220		
120 K ₂ (12 pF)			1MB		
220 (22 pF)			100KB		
270 (27 pF)			1 KB		
390 (39 pF)			KEYBOARD		
820 (82 pF)			ESK307V (61 key)		
101 (100 pF)			FUSE		
151 (150 pF)			250V 0.5A		
221 (220 pF)			LUG BOARD		
231 (330 pF)			L-1205-6P		
391 (390 pF)					
681 (680 pF)					
47 (47 pF)					

7. ADJUSTMENT PROCEDURE

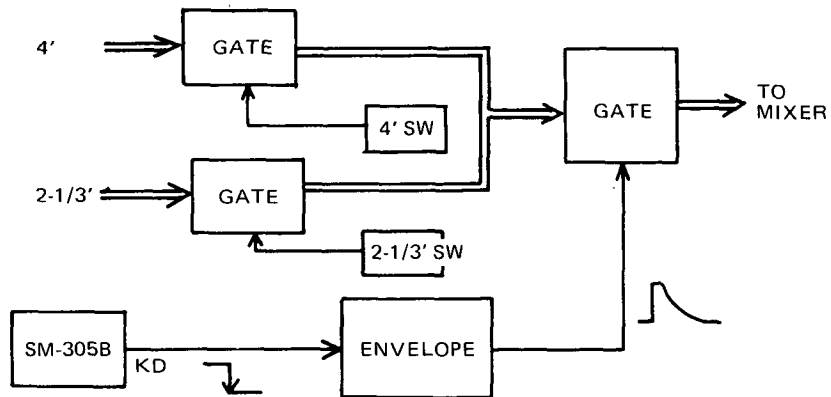
Caution: Very precise adjustments have been made at the factory, so be careful not to change any setting other than that which is out of order.

Circuit Board No.	SECTION	SETTINGS	ADJUSTMENT	ADJUST Vr. No.	Oscilloscope
KLM-244	PITCH	TUNE — CENTER SELECTOR — DRAW- BARS DRAWBARS — 8' SIG OUT — WT10A WT-10A-S/M — METER	Play A and adjust to obtain a 0 cent reading.	VR-1	
KLM-245	NOISE GAIN	SIGOUT(Hi) — OSCILLO.S SELECTOR — DRAW- BARS DRAWBARS — 0 KEYCLICK — MAX VOL — MAX	Adjust to get 0.5V ~0.7V key click sound when a key is played.	VR-7	
	PERCUS GAIN	SIG OUT(Hi) — OSCILLO.S PERCUS VOL — MAX PERCUS DE- CAY — MAX PERCUSSION — 4' SELECTOR — DRAW- BARS DRAWBARS — 4'	Adjust so there is a 7:1~5:1 ratio between percussion 4' and drawbars 4'.	VR-8	
KLM-246	LFO (LOW)	ROTARY EFFE — FAST IC6-1 — f.counter	Adjust to obtain 145msec reading.	VR-6	
	LFO (HIGH)	IC6-7 — f.counter	Adjust to obtain 130msec reading.	VR-5	
	BIAS (LOW)	IC4-3-Digital	Adjust to obtain 6.00V reading.	VR-3	
	BIAS (HIGH)	IC1-3-Digital	Adjust to obtain 6.00V reading.	VR-1	
	AM-H		*	VR-2	

* The AM-H adjustment controls the high range volume fluctuation when the rotating speaker effect is turned on. Listen to the sound to confirm proper adjustment.

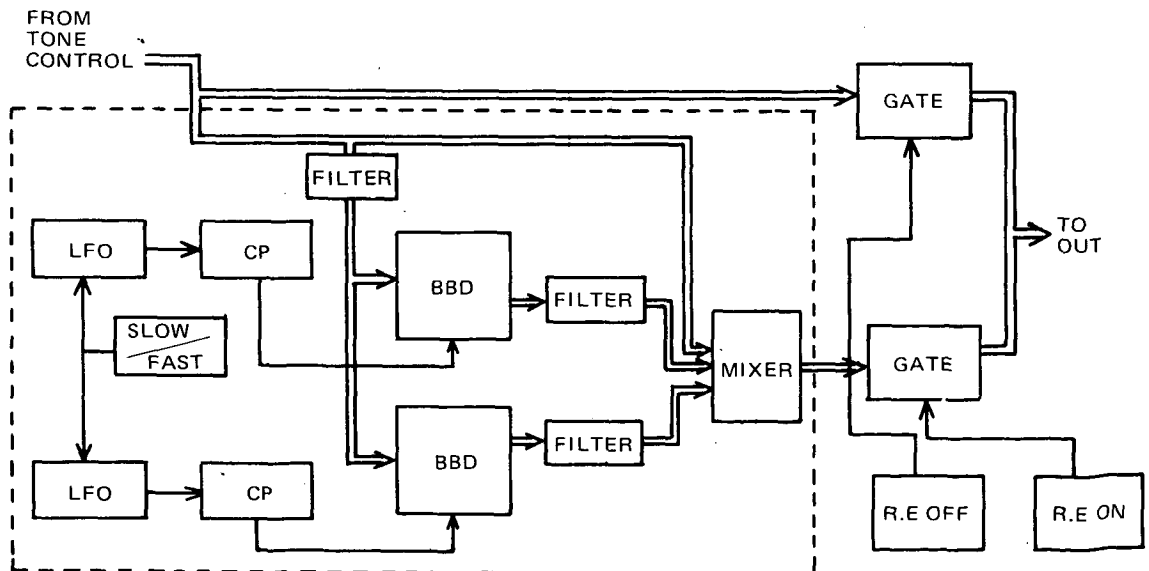
4. Percussion circuit

The percussion circuit uses 4' and 2-2/3' signals. The envelope signal which controls the effect is produced with the SM-305B KD (key-down) single trigger.



5. Rotary Effect circuit

Two BBD circuits are used to produce the rotary effect. The BBDs are IC-MN3004. Refer to the diagram



6. MAIN CIRCUIT EXPLANATIONS

Because the tone circuit is of the programming type, it can be used in many different ways. However, here is only explained how the circuit is used in the CX-3.

1. Tone circuit

IC-SM304A is a data processing IC designed for electronic organ applications.

Data from the 61 keys on the keyboard is converted from a parallel control signal into a series

control signal. After passing through the P/S (parallel-to-series) converter, the data is stored as D in the SR with storage of SM-305A and SM-305B.

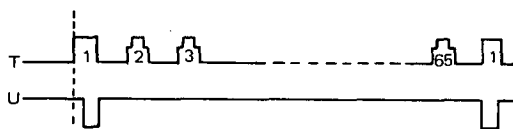
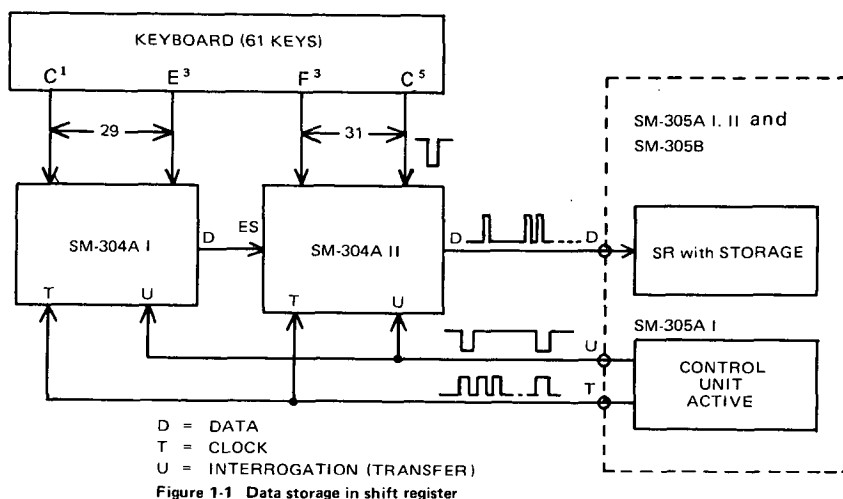


Chart 1-1 T & U timing

U = Simply speaking, the transfer pulse identifies the beginning of the series.

T = The clock pulse counts from 1 to 65 bits. 4 of those bits are for footage group programming and 61 bits are for keyboard programming. Refer to chart 1-2.

SM-305A	Programming bits				OS	Summing-out puts for programming									Footage group	
	PB1	PB2	PB3	PB4		S10'	S9	S6	S7	S8						
	H	H	H	H	RC or H	$\frac{VDD}{2}$									3	
	H	H	H	H	L										1	
SM-305B	Programming bits				P	Summing-outputs for programming										Footage group
	PB1	PB2	PB3	PB4		S40'	S46	S39	S45	S38	S36	S42	S43	S37	S44	
	H	H	H	H	H	$\frac{VDD}{2}$										4
	ES	E1	E2	E3												
	Designation of programming bits. for SM-304															

Chart 1.2. Programming

Chart 1-2 Programming

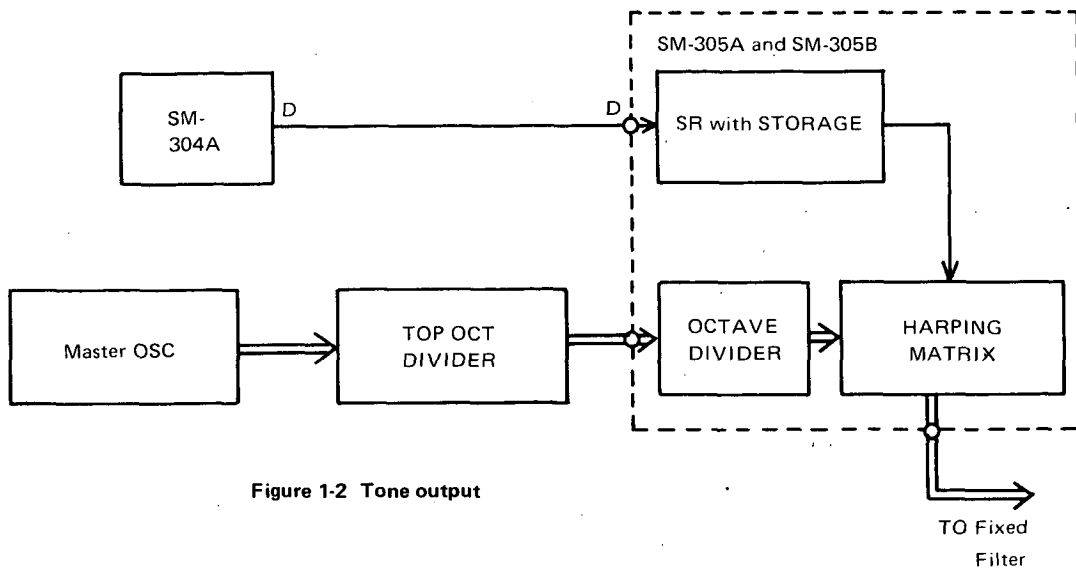


Figure 1-2 Tone output

IC SM-305 includes shift register, octave divider, and harping matrix functions.

The data that had been transferred to the shift register is now transferred to the harping matrix.

There the 12-tone octave divider and sound is produced in accordance with the data. Refer to figure 1-2.

Harping Matrix

SM-305A produces 3 footage groups.

Footage Group-1	4'	2-2/3'	2'	1-1/3'
Footage Group-2	8'	5-1/3'	4'	2-2/3'
Footage Group-3	16'	10-2/3'	8'	5-1/3'

SM-305B produces 2 footage groups.

Footage Group-4	1-3/5'	1'	2/3'	1/2'
Footage Group-5	4/5'	1/3'	1/4'	1/8'

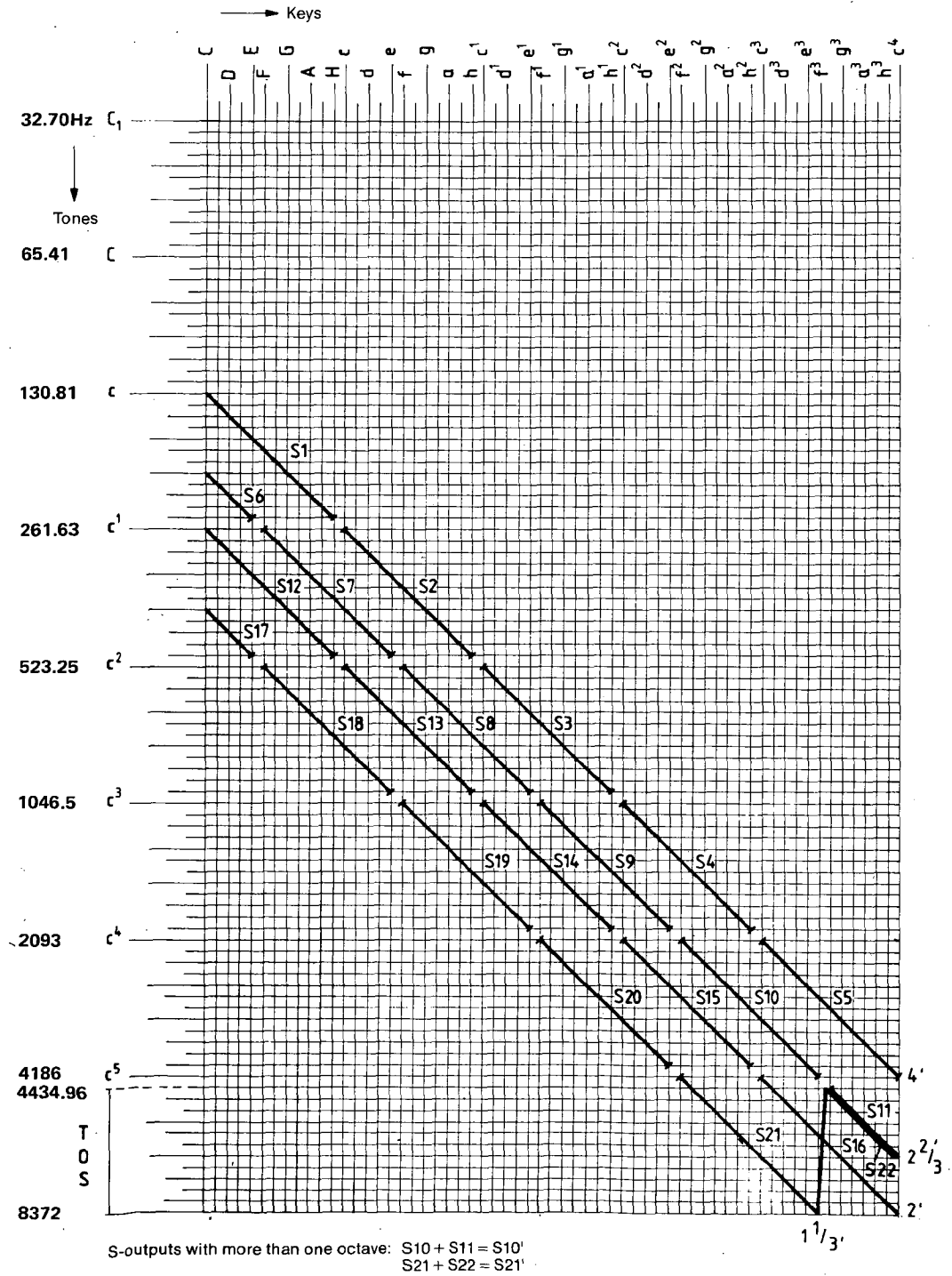
Footage groups used in the CX-3 are as listed below.

SM-3054-I	Footage group-3	(But without 10-2/3')
SM-3054-II	Footage group-1	
SM-3058	Footage group-4	(But without 2/3' or 1/2')

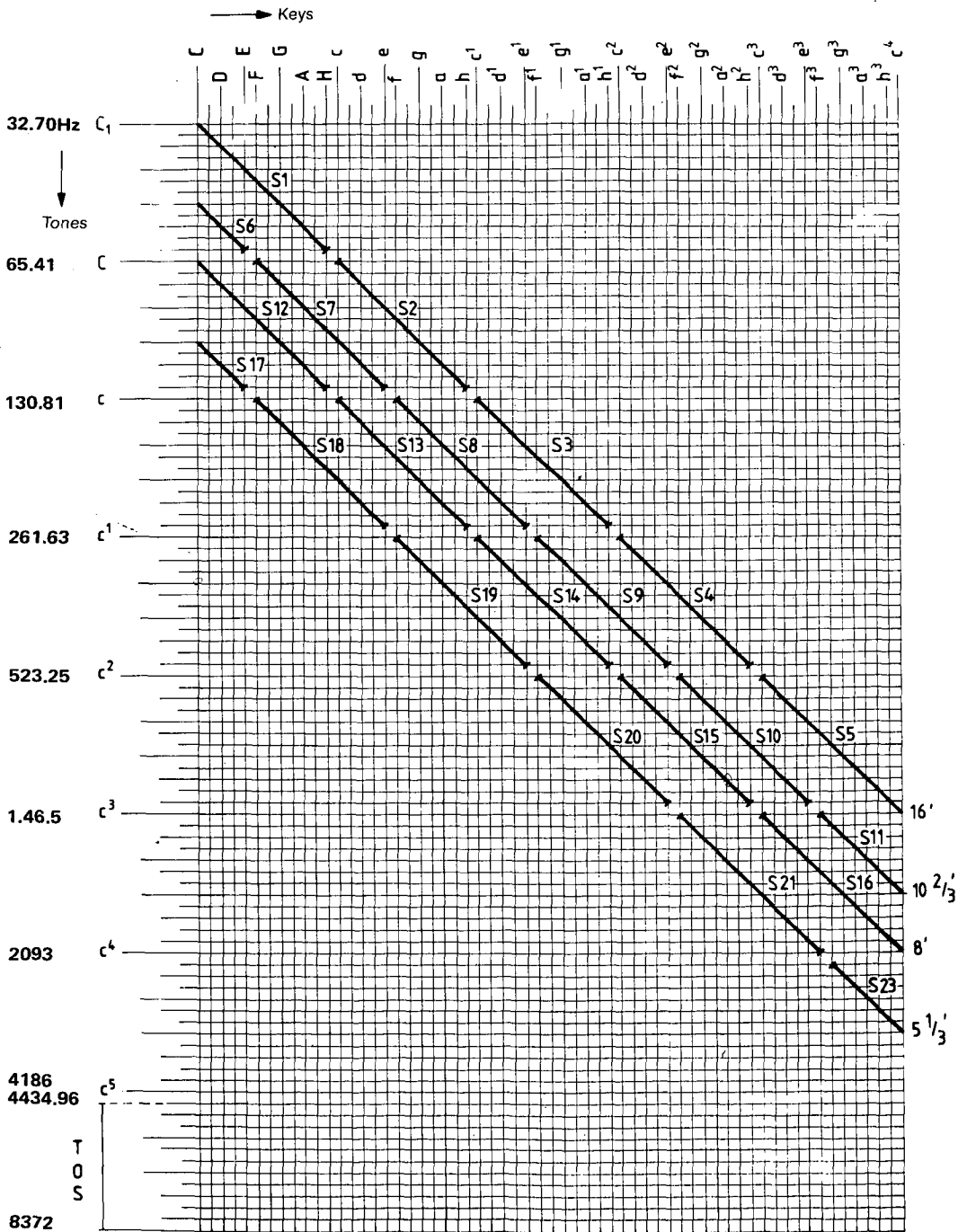
(Refer to the Harping matrix — footage group chart)

In other words, the top octave divider produces 12 frequencies — C# (4434.96Hz) D, D#... B, C (8372Hz) etc. For example, to get 4' C, which is 4 octaves lower, the 4186Hz is divided by 32 to obtain 130.81Hz (C). This note centered around VDD/2 is sent to tone out and from there to each of the fixed filters.

SM-305A-II Harping matrix for footage group 1

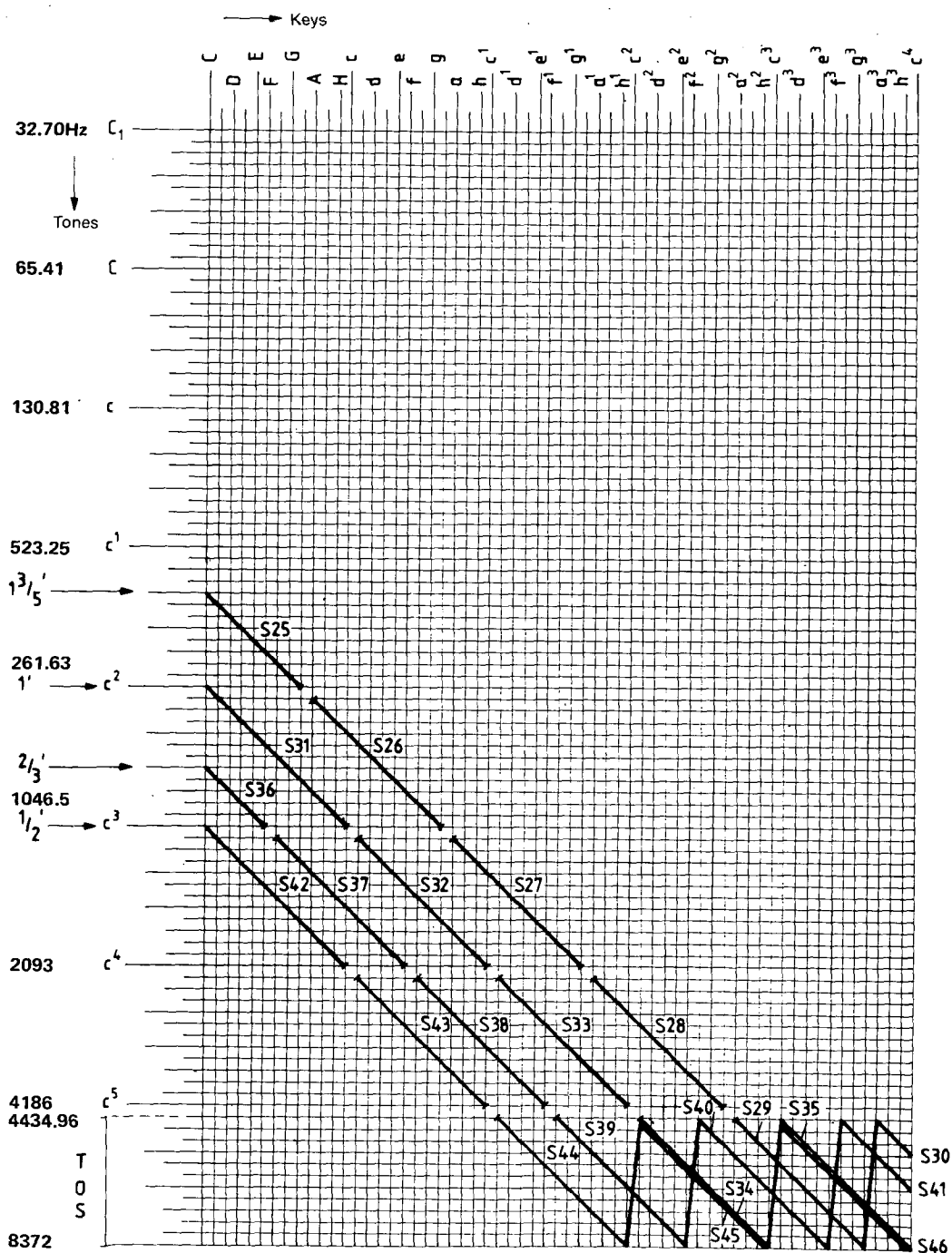


SA-305A-I Harping matrix for footage group 3



S-outputs with more than one octave: $S_{10} + S_{11} = S_{10}'$
 $S_{21} + S_{23} = S_{21}'$

SM-305B Harping matrix for footage group 4


$$\begin{aligned} \text{\$-outputs with more than one octave: } & S_{29} + S_{30} = S_{29}' \\ & S_{40} + S_{41} = S_{40}' \end{aligned}$$

2. Filter circuitry

There are fixed filters for each tone; separate outputs are provided for presets and drawbars; the selector buttons determine which gate is operated to pass the signal on to the mixer.

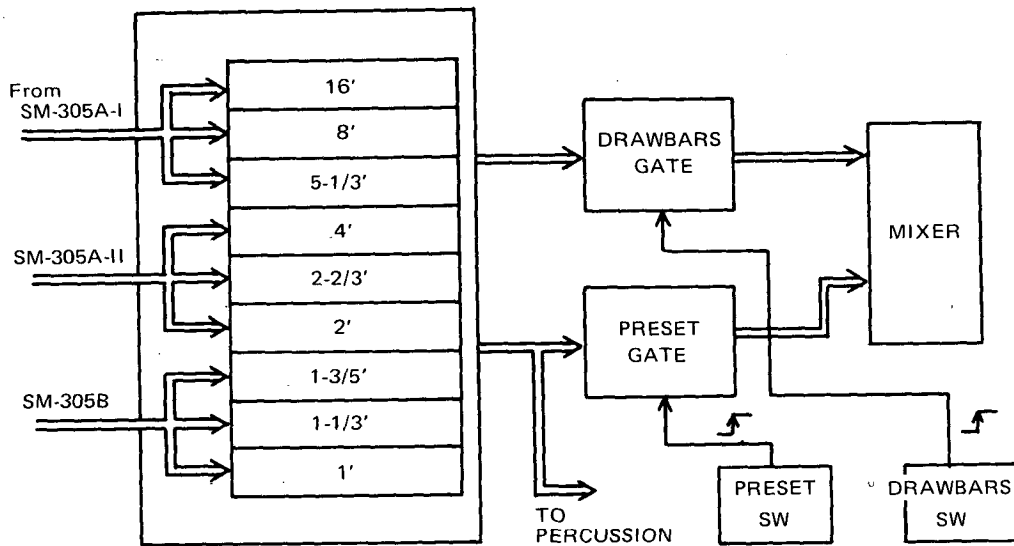
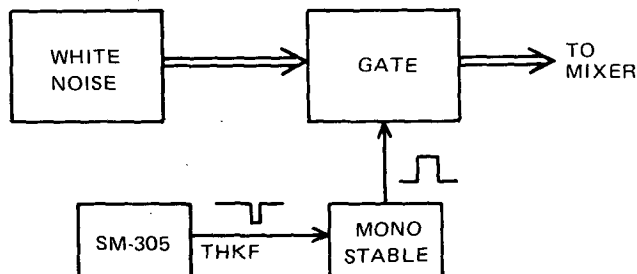




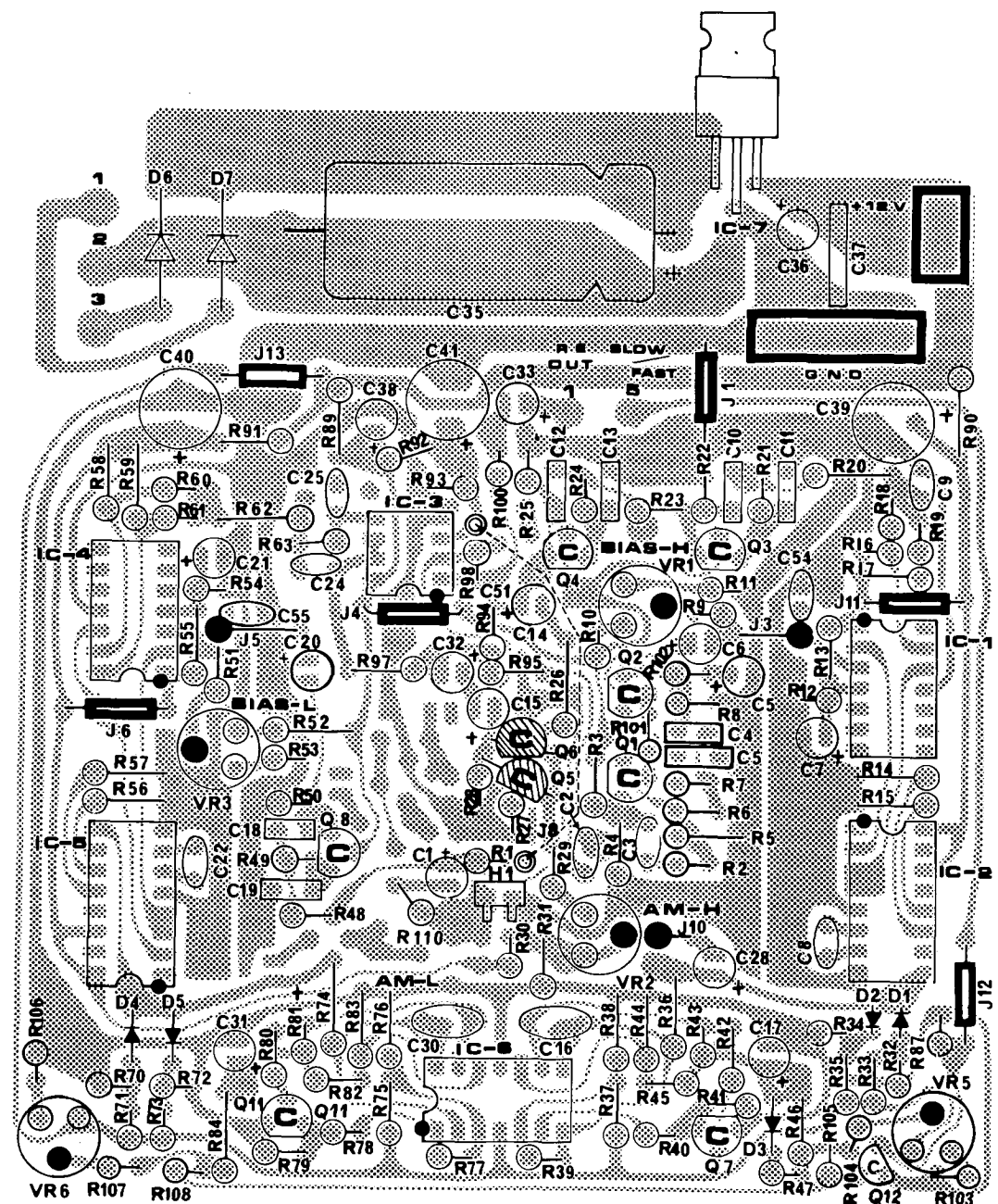
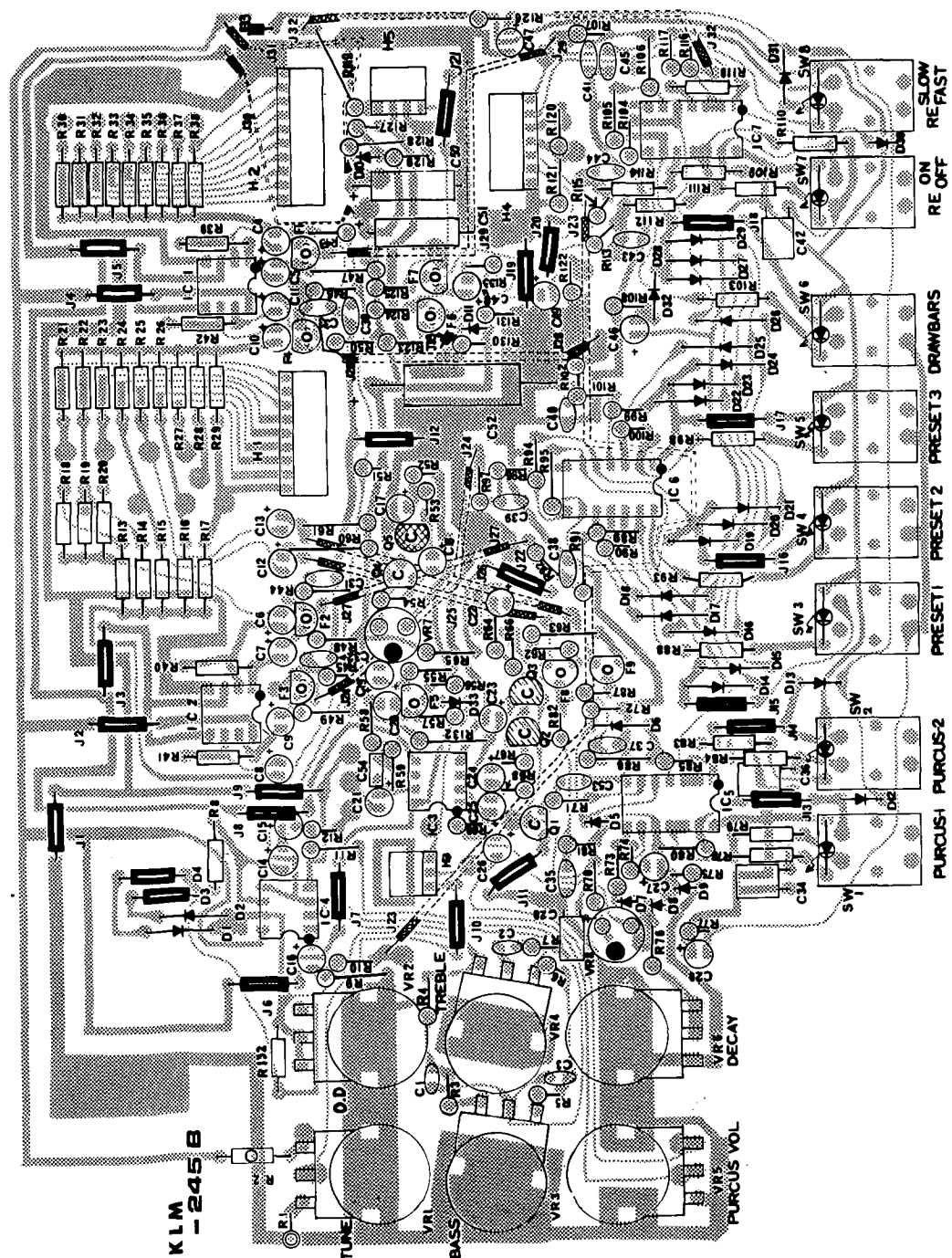
Figure 2-1 Filters

3. Key-Click circuit

White noise is used to produce the key-click effect. The SM-305A THKF (multiple trigger) controls the effect.

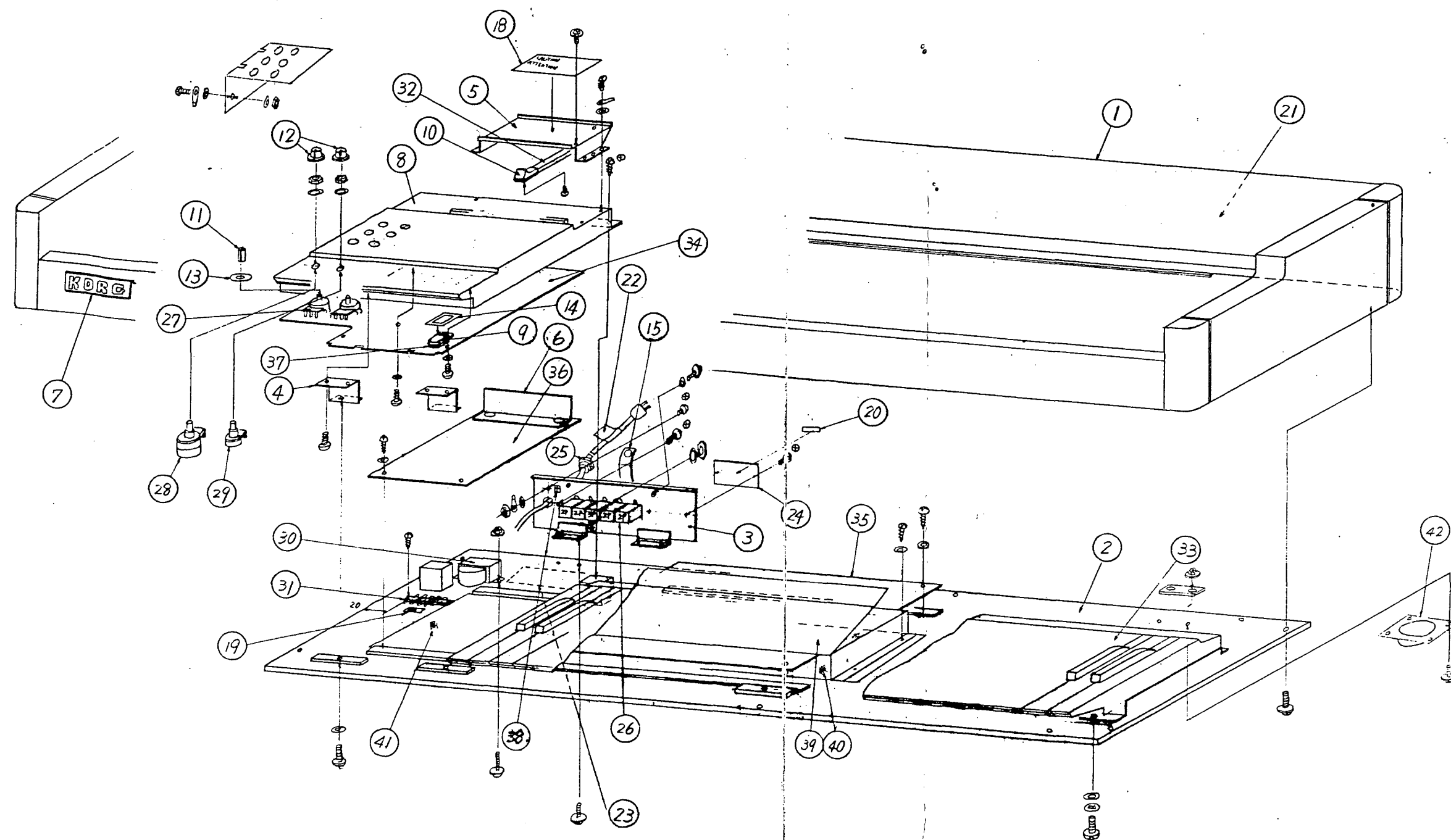


PARTS NAME	SPECIFICATIONS	Q'TY	PARTS NAME	PANEL INSTRUCTION	STANDARD
CONNECTORS			POTENTIOMETERS		
	CX3-1 KO-131	1		VOLUME	EVC-BO5P18B14
	132	1		KEY CLICK	EVH-8MA803A14
	121	1		TUNE	EVH-LOAS20B14
	122	1		OVER DRIVE	EVH-LOAS20B16
	123	1		BASS	EVH-LOAS20B15
	101	1		TREBLE	EVH-LOAS20B15
	91	1		PERCUS DECAY	EVH-LOAS20A55
	71	1		PERCUS VOL	EVH-LOAS20A14
	41	1	SLIDE VOLUME		
	21	1		DRAWBAR x 9	S401XKA10KC
	22	1	SELECT SWITCH		
	92	1		SELECT x 8	KHC11901-with LED
	32	1	ROTARY KNOB		
	TRC-1	1		Rotary knob (Large) 18φ	
	100	1		Rotary knob (Small) for PS	
TOP ENTRY			DRAWBAR KNOB		
	13P (B13P-SHF-1)	2		Drawbar knob 5-1/3'	Brown { No.1 2 3 4
	12 (B12P-SHF-1)	3		Drawbar knob 2-2/3'	
	9 (B9B-SHF-1)	2		Drawbar knob 1-3/5'	
	3 (B3P-SHF-1)	1		Drawbar knob 1-1/3'	
	2P (B2P-SHF-1)	2		Drawbar knob 16'	Ivory { 5 6 7 8 9
BOTTOM ENTRY				Drawbar knob 8'	
	10P (BE10P-SHF-1)	1		Drawbar knob 4'	
	9 (BE9P-SHF-1)	1		Drawbar knob 2'	
	7 (BE7P-SHF-1)	1		Drawbar knob 1'	
	4 (BE4P-SHF-1)	1			
	3 (BE3P-SHF-1)	1		Select knob (gray)	
PRINTED CIRCUIT BOARD				Select knob (Brown)	
	(KLM244)	1	PHONE JACK		
	(KLM245)	1		RETURN	0929
	(KLM246)	1		OTHERS x 4	0983
BUSHING					
	SR-6W-1	3			
POWER TRANSFORMER					
	JA-221-12	1			
	JB-221-12	1			
BUSHING					
	4K-4	3			
	5P-4	3			



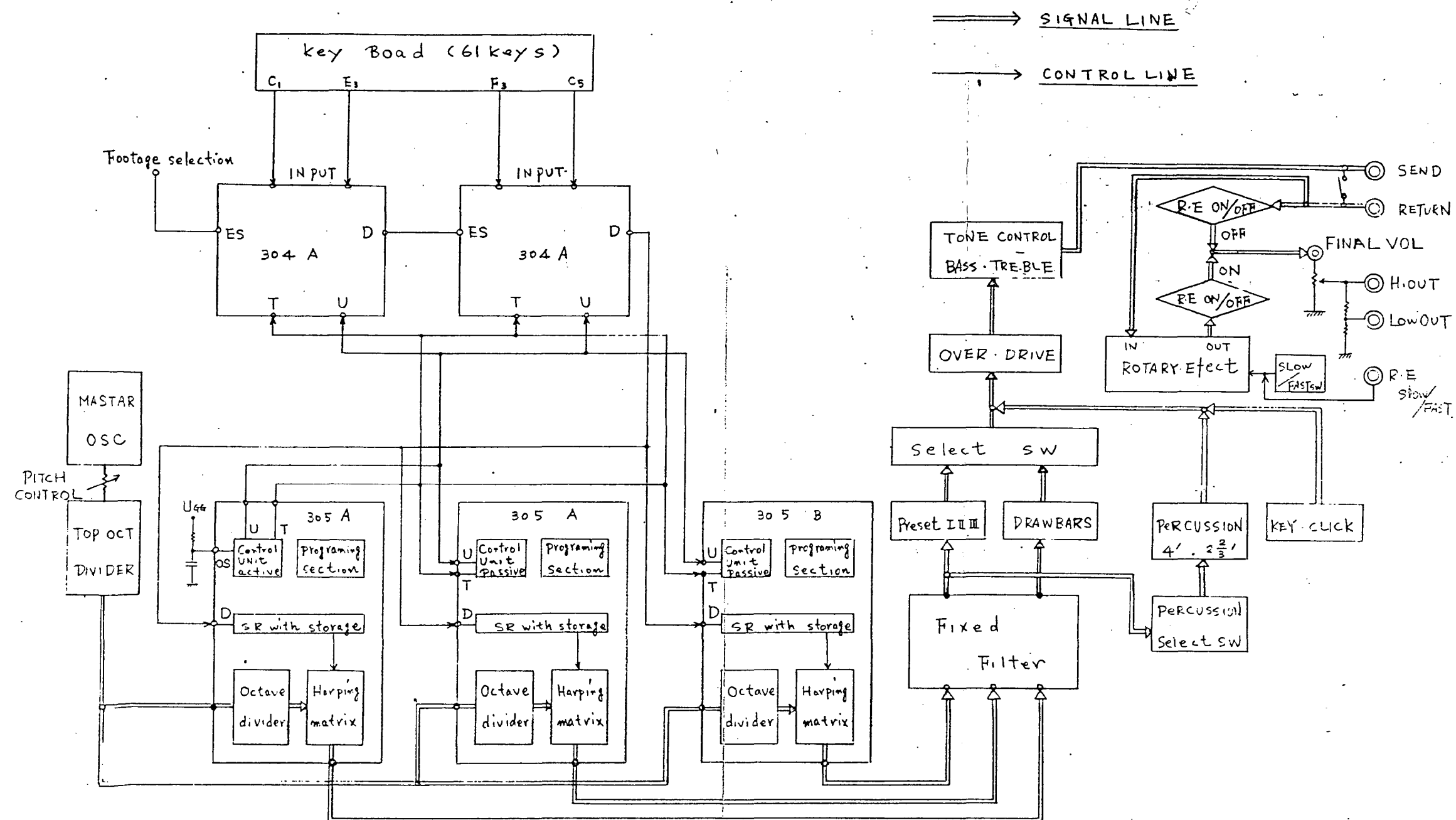
KORG KLM-246C

2. STRUCTURAL DIAGRAM

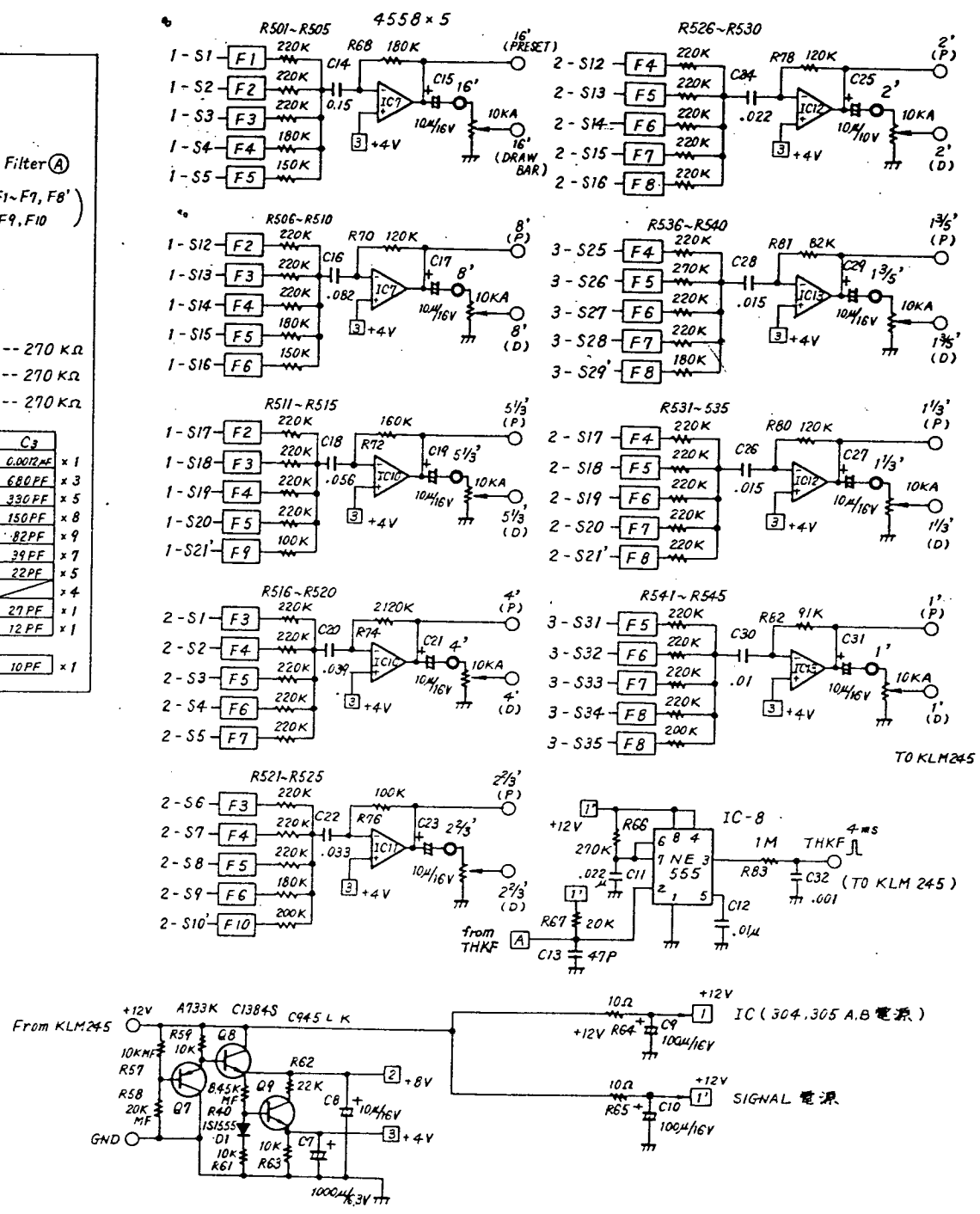
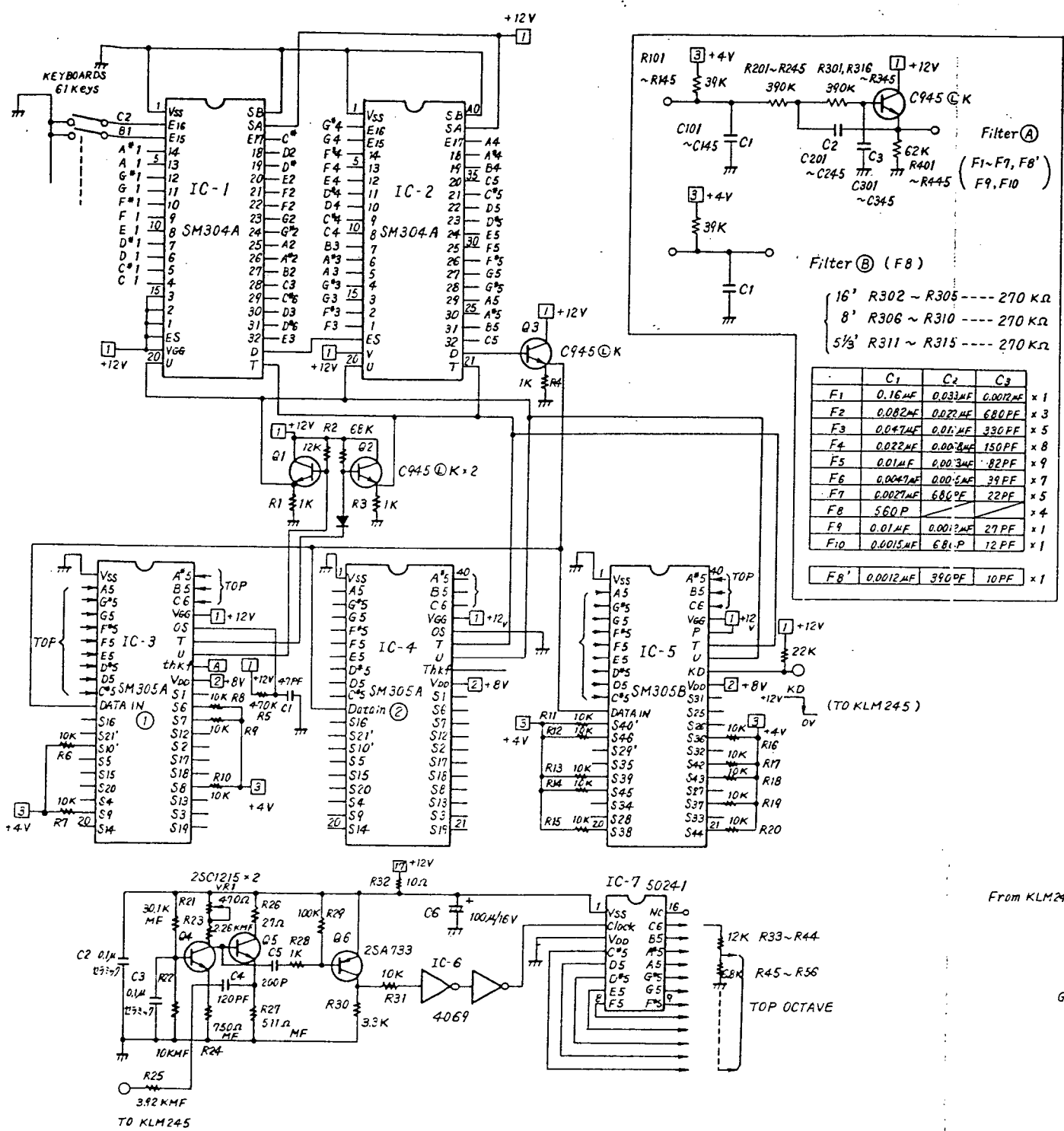


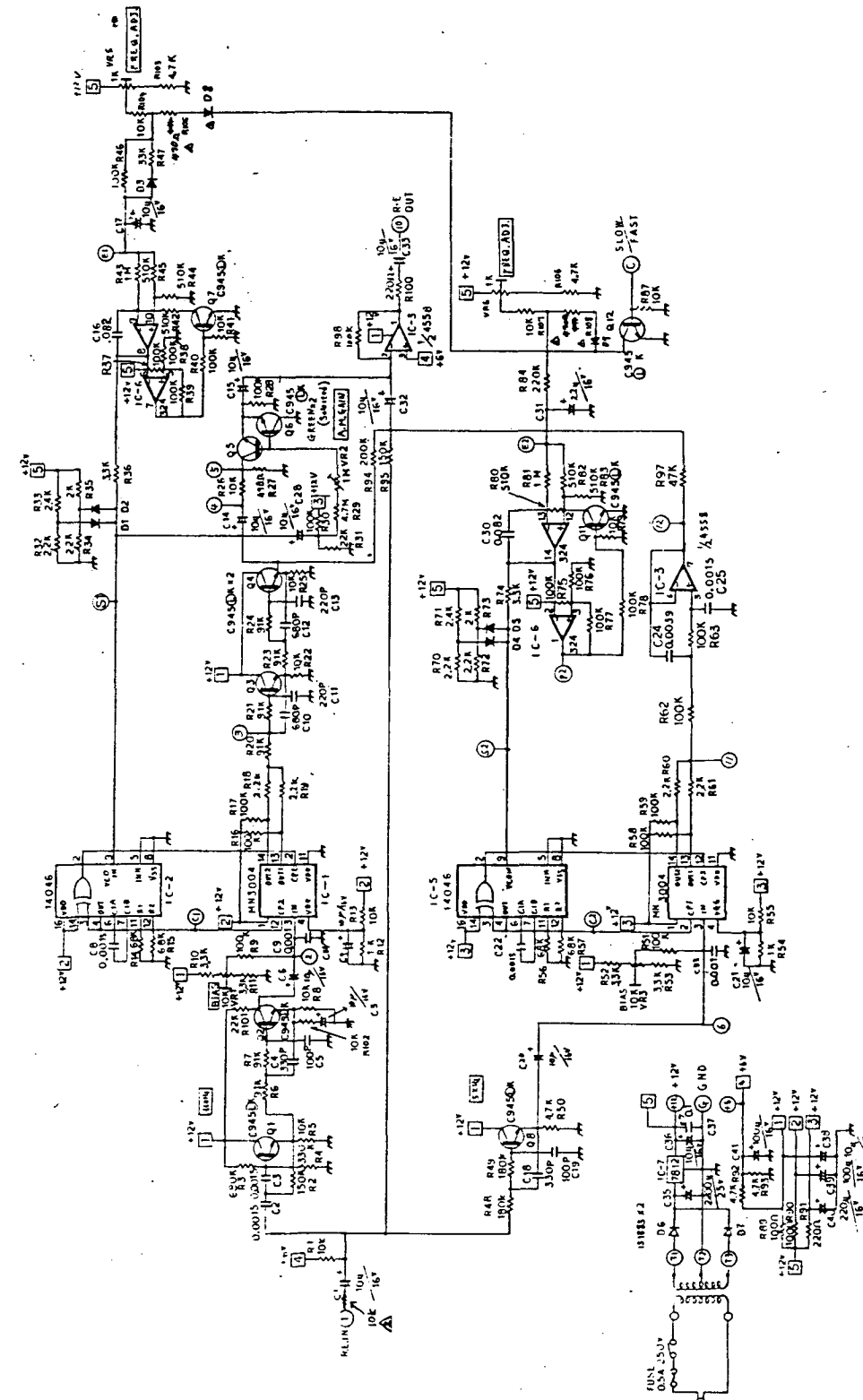
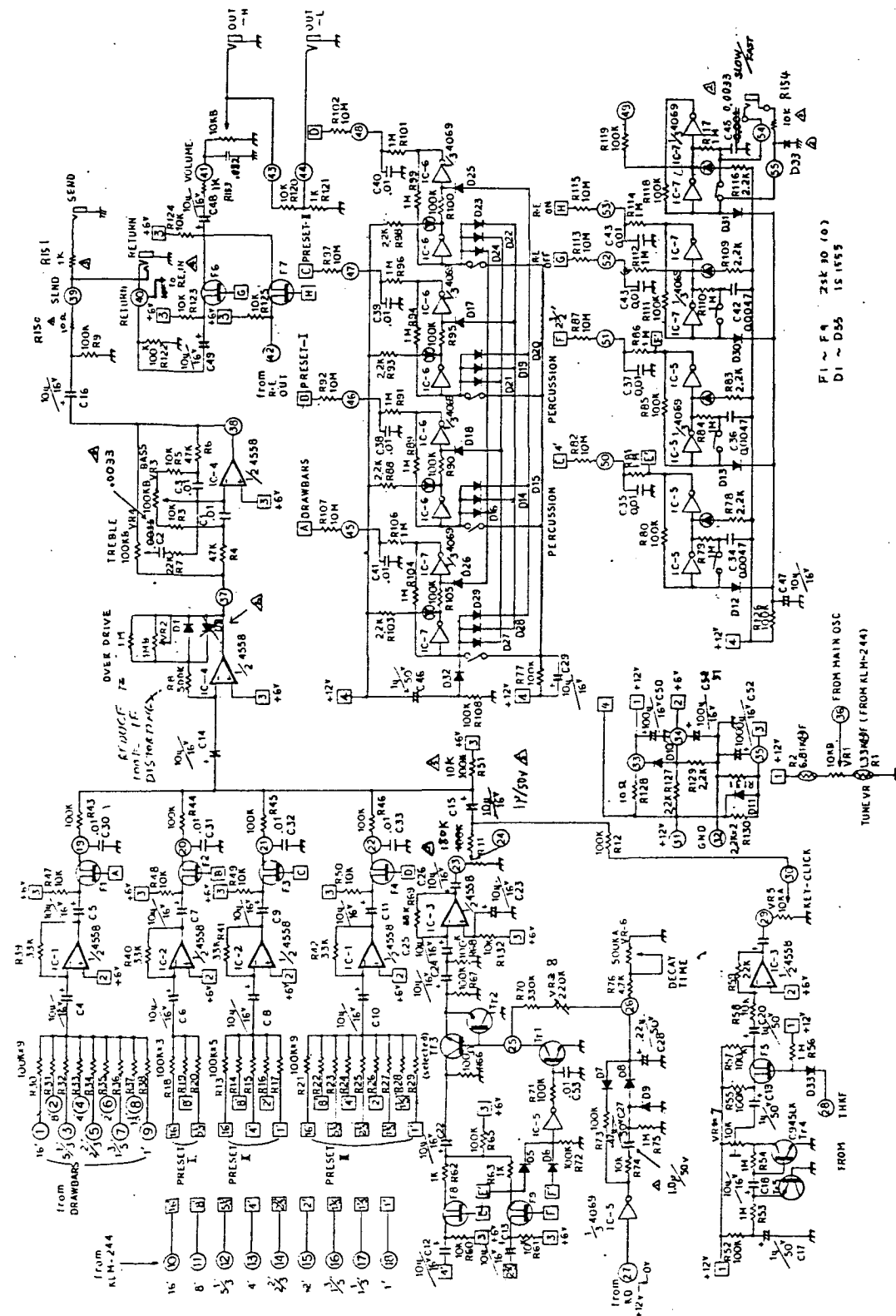
Item	Part Name	Remarks	Item	Part Name	Remarks	Item	Part Name	Remarks	Item	Part Name	Remarks
1.	Cabinet		11.	PS knob (small)		23.	Service caution seal		33.	Keyboard	
2.	Bottom		12.	Rotary knob		24.	Model number plate		34.	Control circuit board	
3.	Rear panel		13.	Lever SW. mask		25.	Strain release bushing		35.	Main circuit board	
4.	Control panel mounting		14.	Selector SW mask		26.	Phone jack		36.	R.E. Circuit board	
5.	Draw bar holder		15.	Cord stopper		27.	Rotary variable resistors		37.	Selector SW	
6.	Radiation board		18.	Fuse caution seal		28.	Rotary variable resistors		38.	Earth (ground) seal	
7.	KORG Mark (Small)		19.	Fuse seal		29.	Rotary variable resistors		39.	Sealed cover	
8.	Control panel		20.	Serial number seal		30.	Power transformer		40.	Aluminum film	
9.	Selector SW knob		21.	KORG Mark seal		31.	Lug board		41.	Aluminum film	
10.	Draw bar knob		22.	Wiring caution (large)		32.	Draw bar		42.	Metal fitting of stand	

3. BLOCK DIAGRAM

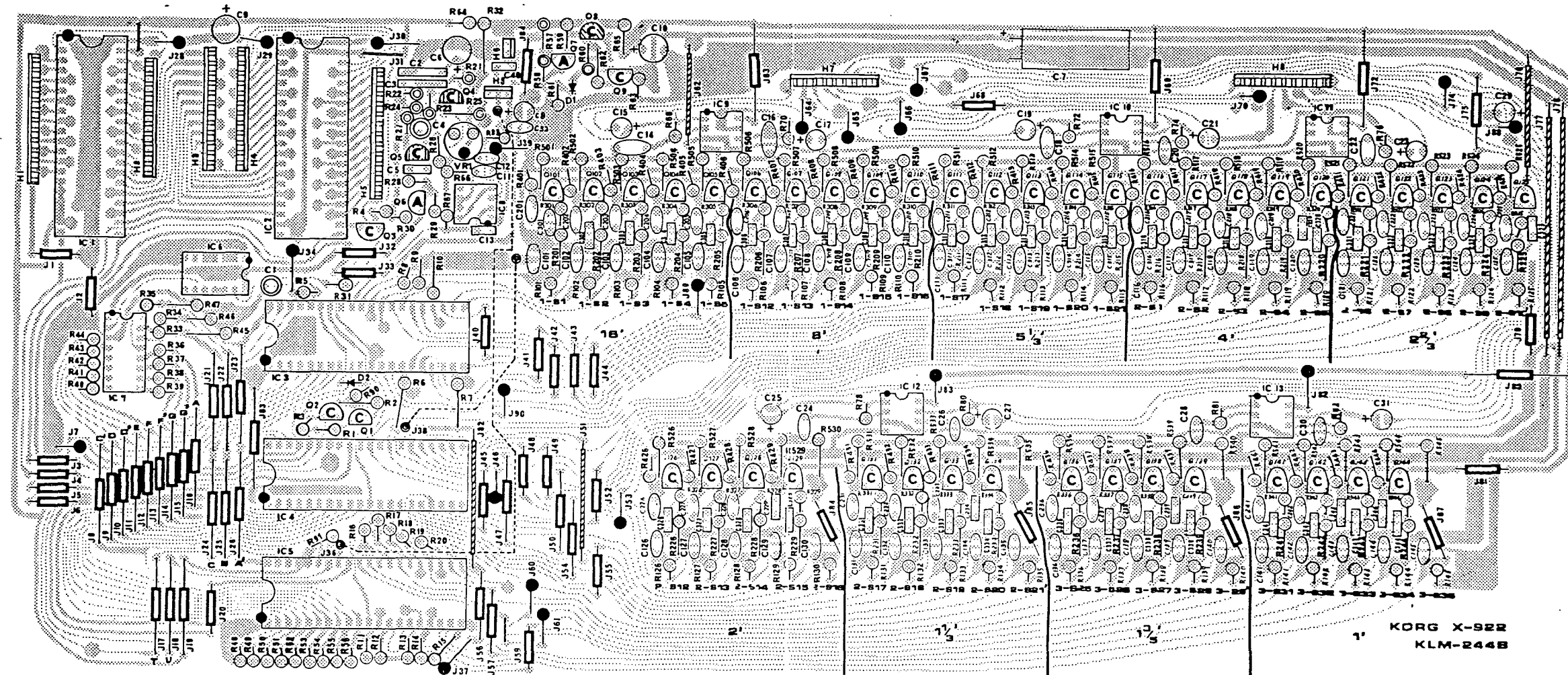


4. CIRCUIT DIAGRAM KLM-244





5. PC BOARD



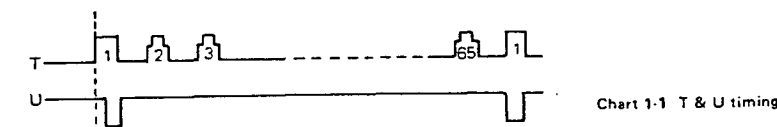
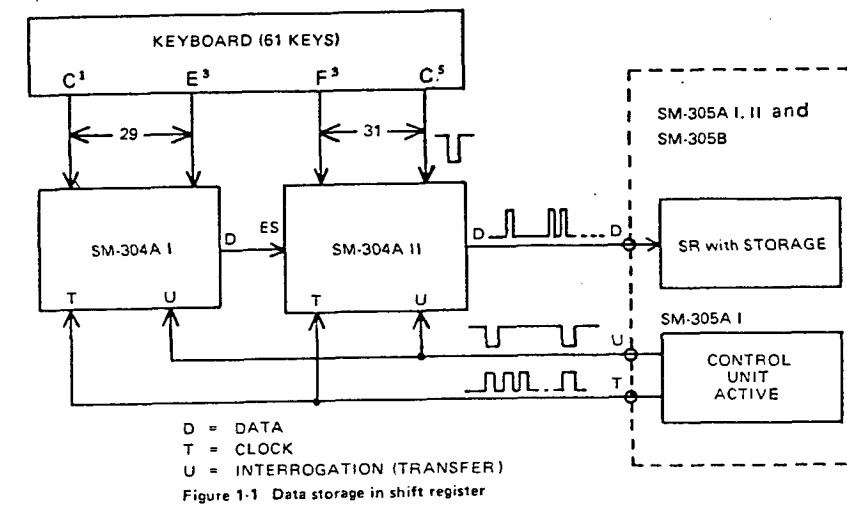
6. MAIN CIRCUIT EXPLANATIONS

Because the tone circuit is of the programming type, it can be used in many different ways. However, here is only explained how the circuit is used in the CX-3.

1. Tone circuit

IC-SM304A is a data processing IC designed for electronic organ applications. Data from the 61 keys on the keyboard is converted from a parallel control signal into a series

control signal. After passing through the P/S (parallel-to-series) converter, the data is stored as D in the SR with storage of SM-305A and SM-305B.



U = Simply speaking, the transfer pulse identifies the beginning of the series.

T = The clock pulse counts from 1 to 65 bits. 4 of those bits are for footage group programming and 61 bits are for keyboard programming. Refer to chart 1-2.

SM-305A	Programming bits				OS	Summing-out puts for programming					Footag group					
	PB1	PB2	PB3	PB4		S10'	S9	S6	S7	S8						
	H	H	H	H	RC or H	$\frac{VDD}{2}$					3					
	H	H	H	H	L						1					
SM-305B	Programming bits				P	Summing-outputs for programming										Footag group
	PB1	PB2	PB3	PB4		S40'	S46	S39	S45	S38	S36	S42	S43	S37	S44	
	H	H	H	H	H	$\frac{VDD}{2}$										4
	ES	E1	E2	E3												
Designation of programming bits for SM-304																

Chart 1-2. Programming

Chart 1-2 Programming

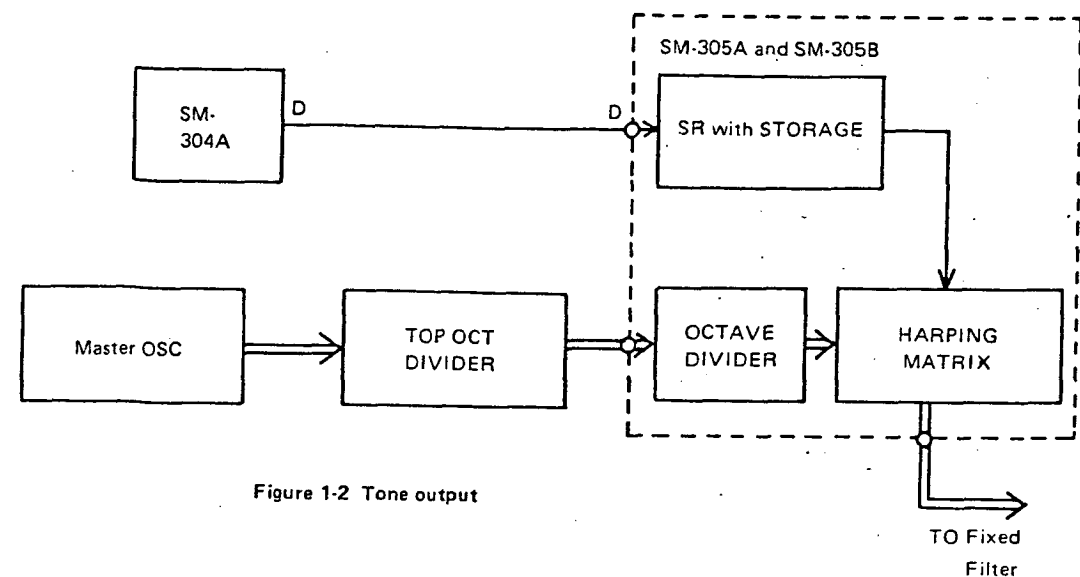


Figure 1-2 Tone output

IC SM-305 includes shift register, octave divider, and harping matrix functions.

The data that had been transferred to the shift register is now transferred to the harping matrix.

Harping Matrix

SM-305A produces 3 footage groups.

Footage Group-1	4'	2-2/3'	2'	1-1/3'
Footage Group-2	8'	5-1/3'	4'	2-2/3'
Footage Group-3	16'	10-2/3'	8'	5-1/3'

SM-305B produces 2 footage groups.

Footage Group-4	1-3/5'	1'	2/3'	1/2'
Footage Group-5	4/5'	1/3'	1/4'	1/8'

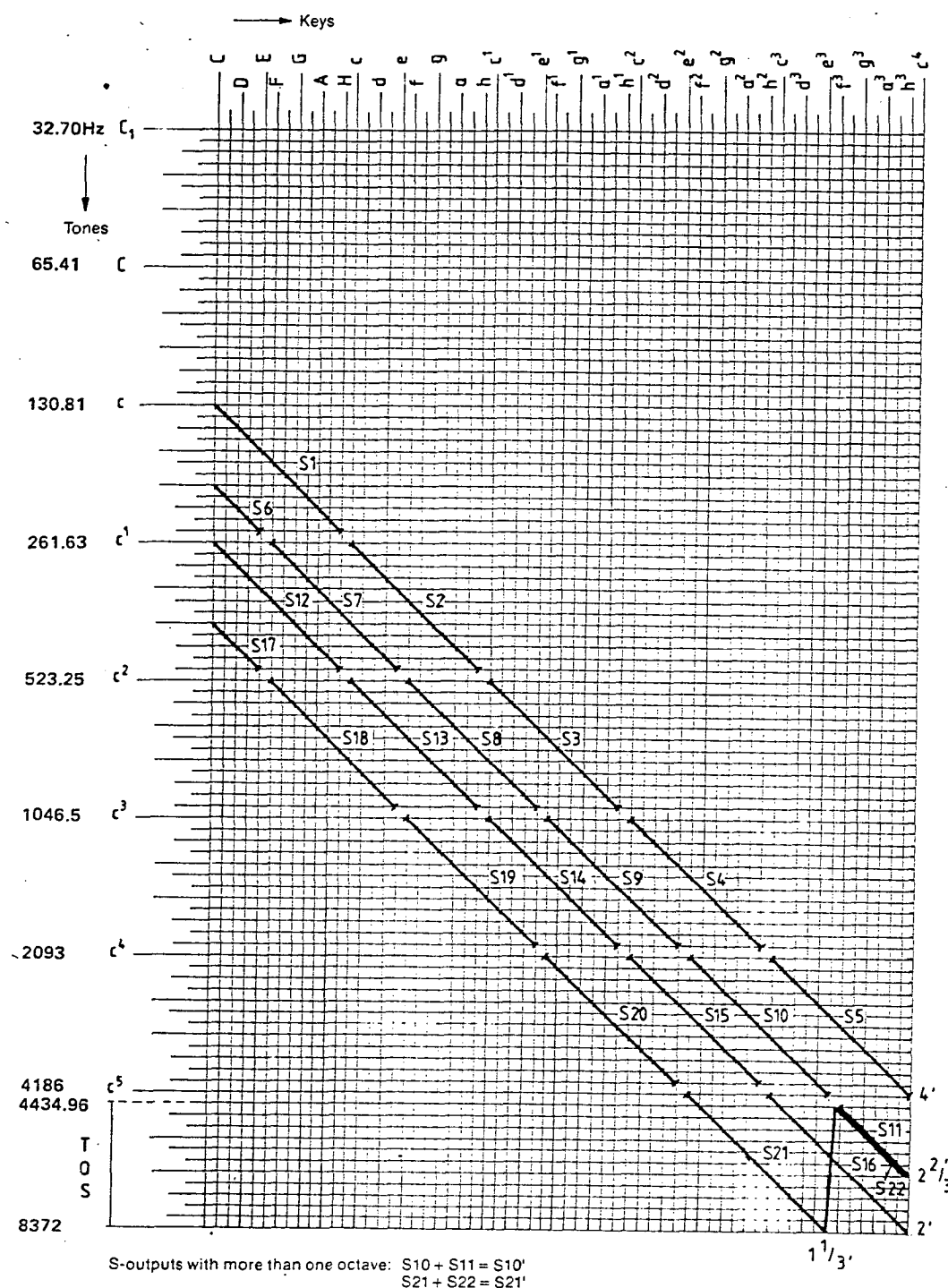
Footage groups used in the CX-3 are as listed below.

SM-3054-I	Footage group-3	(But without 10-2/3')
SM-3054-II	Footage group-1	
SM-3058	Footage group-4	(But without 2/3' or 1/2')

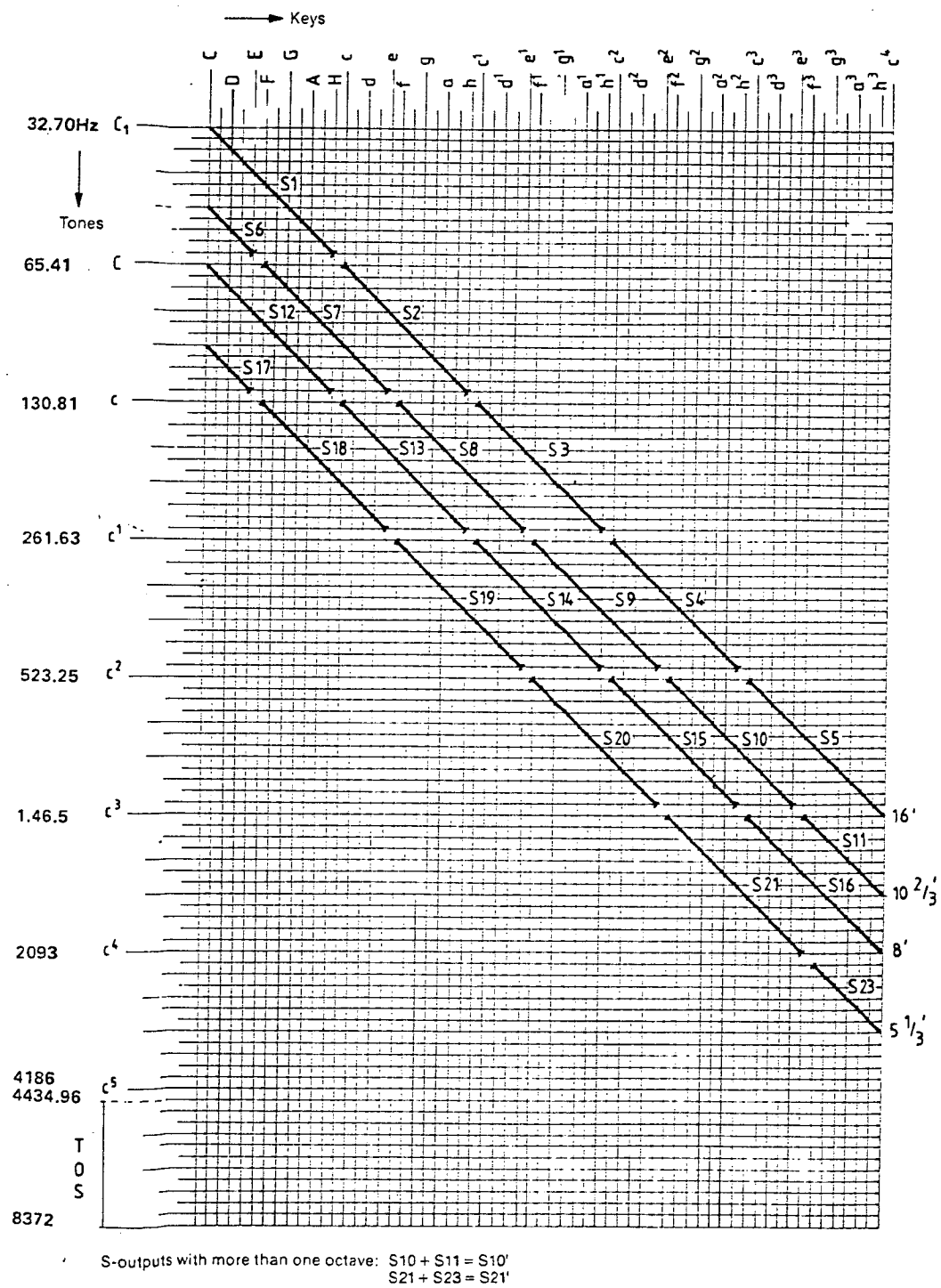
(Refer to the Harping matrix — footage group chart)

In other words, the top octave divider produces 12 frequencies — C# (4434.96Hz) D, D# ... B, C (8372Hz) etc. For example, to get 4' C, which is 4 octaves lower, the 4186Hz is divided by 32 to obtain 130.81Hz (C). This note centered around VDD/2 is sent to tone out and from there to each of the fixed filters.

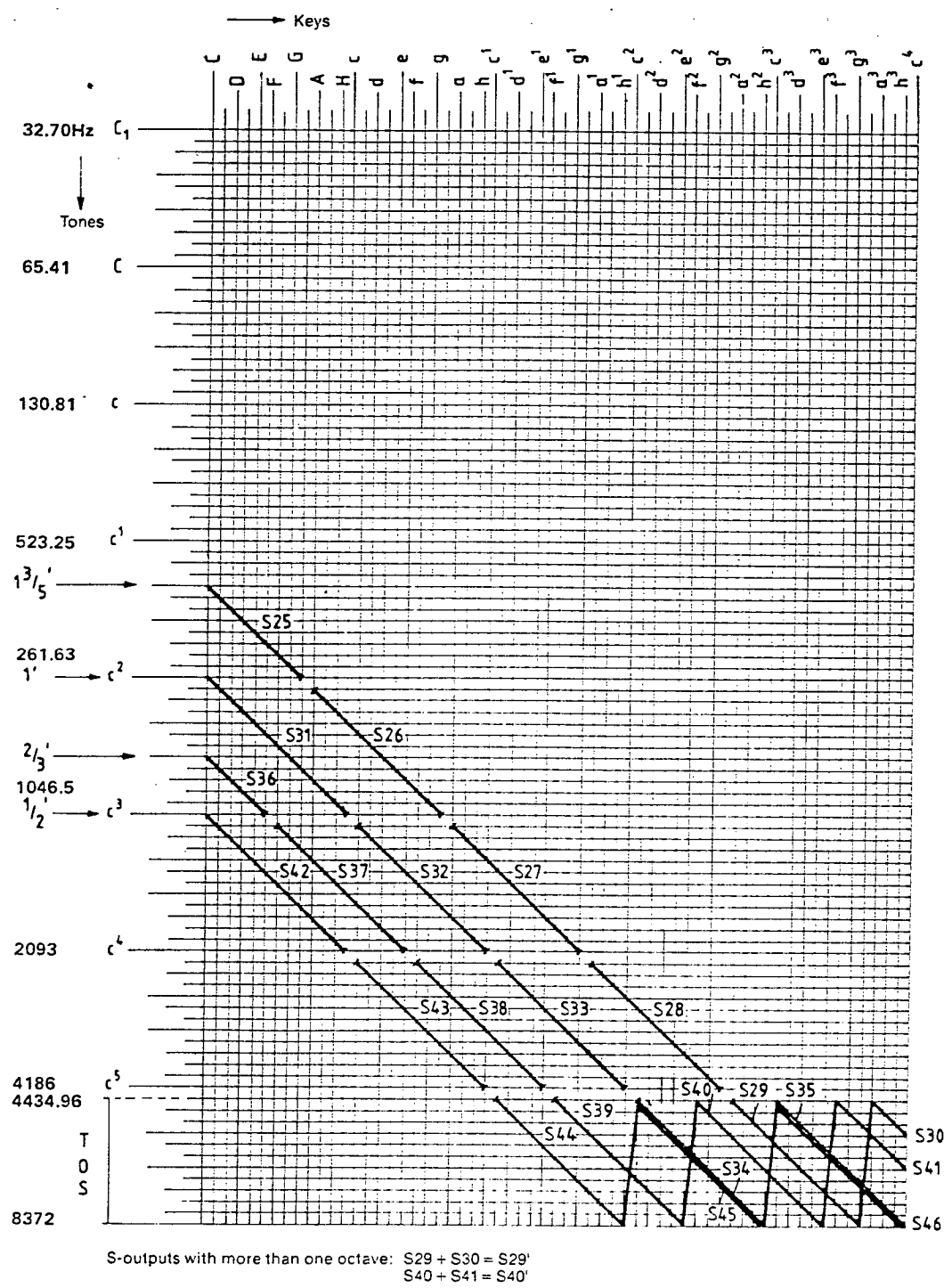
SM-305A-II Harping matrix for footage group 1



SA-305A-1 Harping matrix for footage group 3



SM-305B Harping matrix for footage group 4



2. Filter circuitry

There are fixed filters for each tone; separate outputs are provided for presets and drawbars; the selector buttons determine which gate is operated to pass the signal on to the mixer.

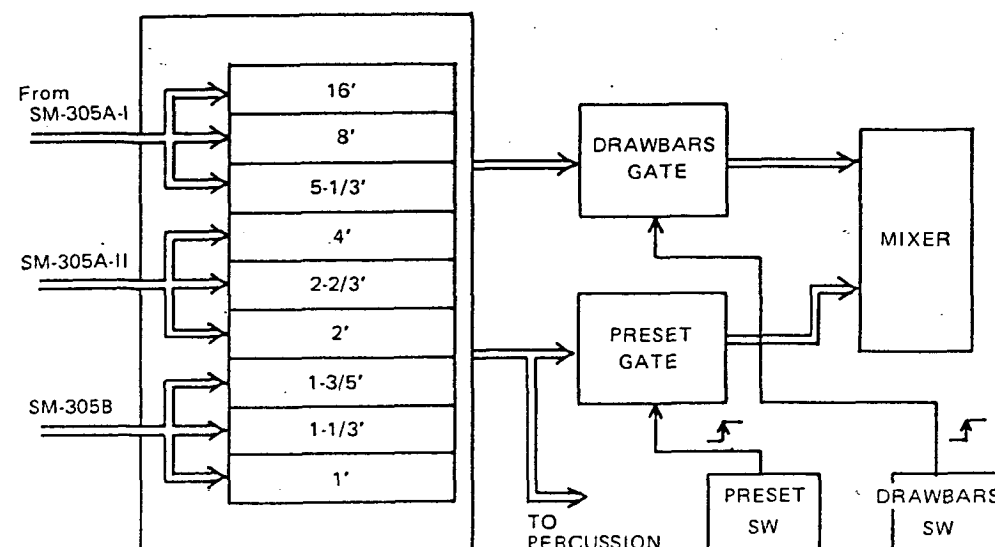
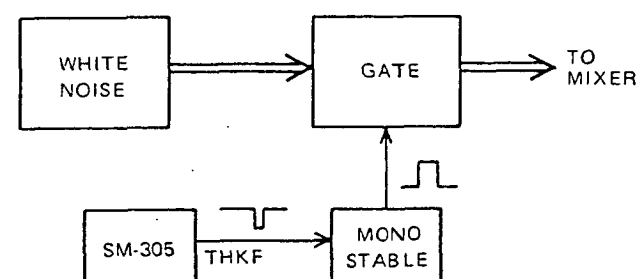


Figure 2-1 Filters

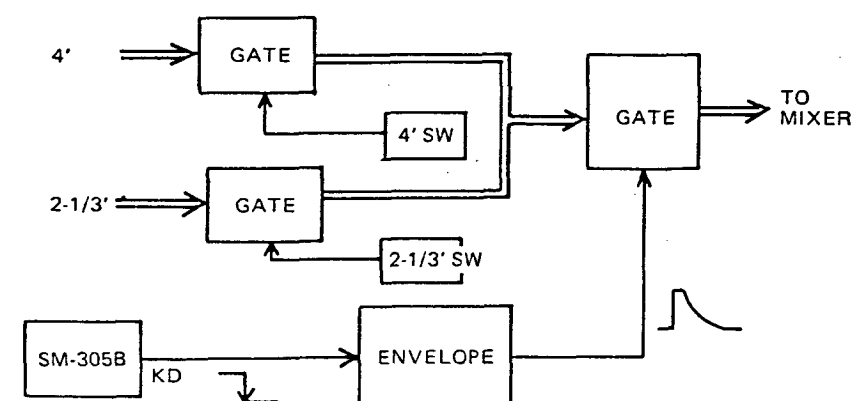
3. Key-Click circuit

White noise is used to produce the key-click effect. The SM-305A THKF (multiple trigger) controls the effect.



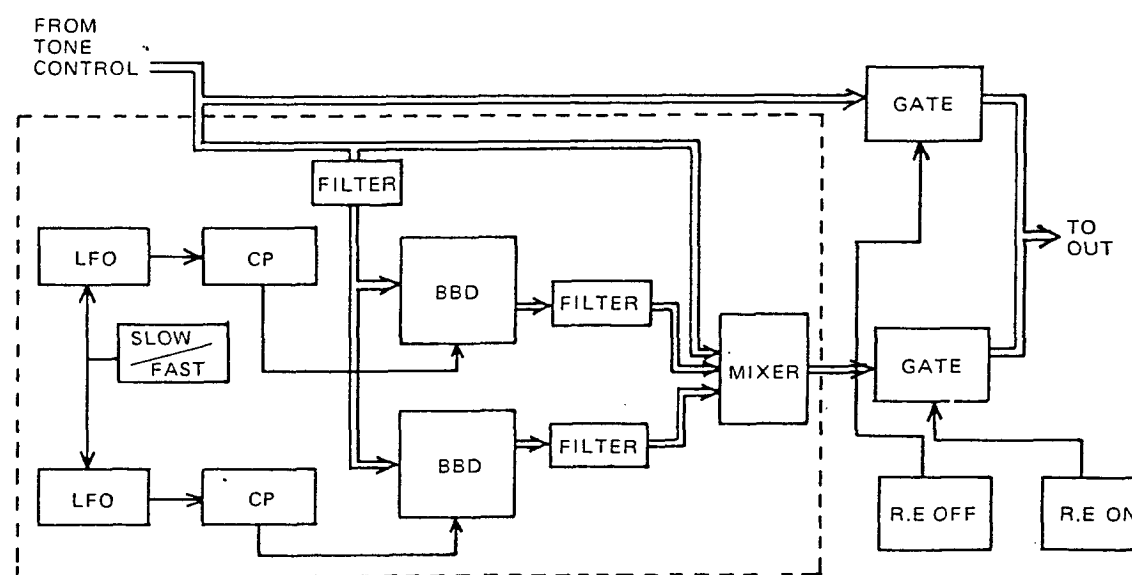
4. Percussion circuit

The percussion circuit uses 4' and 2-2/3' signals. The envelope signal which controls the effect is produced with the SM-305B KD (key-down) single trigger.



5. Rotary Effect circuit

Two BBD circuits are used to produce the rotary effect. The BBDs are IC-MN3004. Refer to the diagram



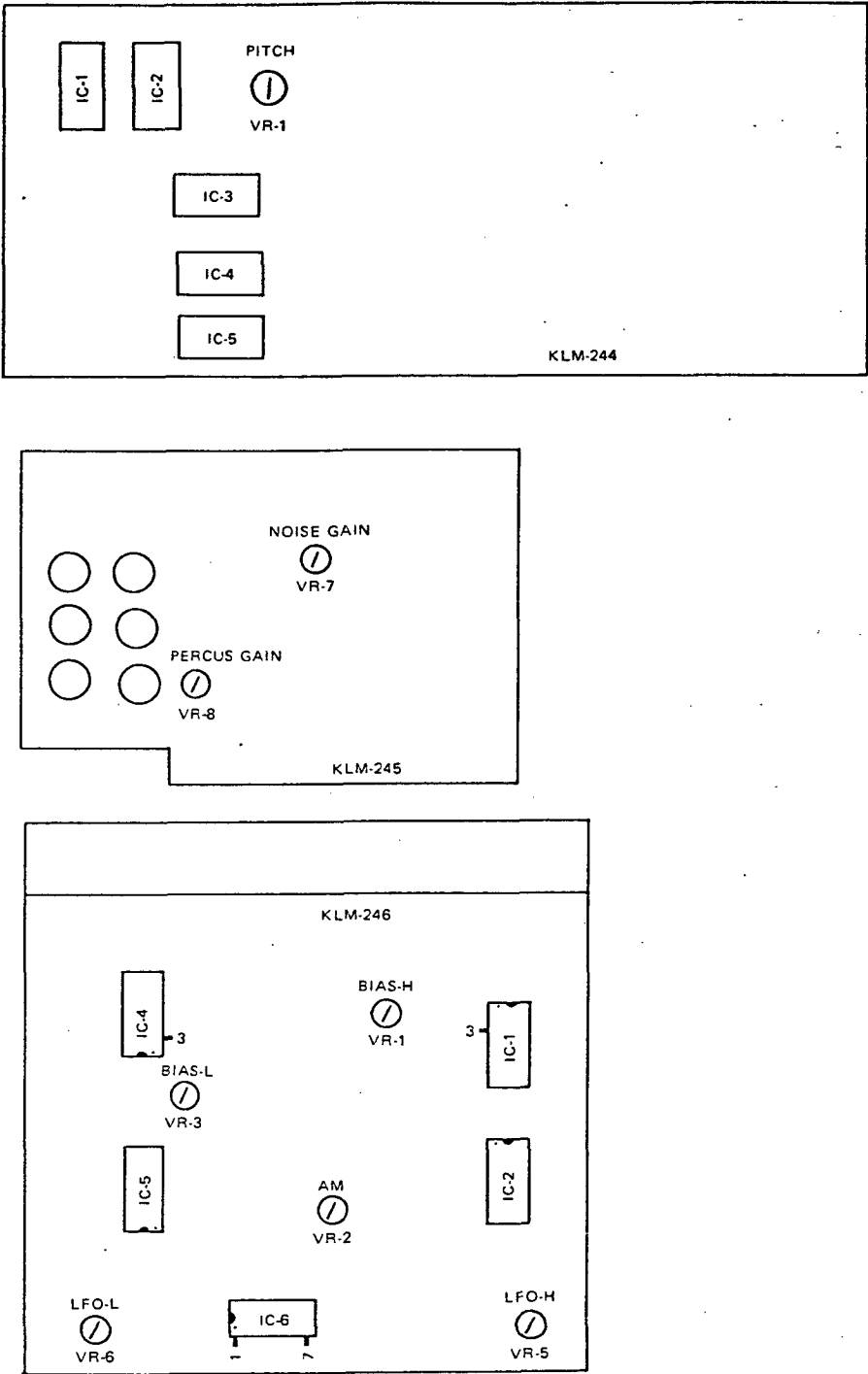
7. ADJUSTMENT PROCEDURE

Caution: Very precise adjustments have been made at the factory, so be careful not to change any setting otehr than that which is out of order.

Circuit Board No.	SECTION	SETTINGS	ADJUSTMENT	ADJUST Vr. No.	Oscilloscope
KLM-244	PITCH	TUNE - CENTER SELECTOR - DRAW- BARS DRAWBARS - 8' SIG OUT - WT10A WT-10A-S/M -METER	Play A and adjust to obtain a 0 cent reading.	VR-1	
KLM-245	NOISE GAIN	SIGOUT(Hi) - OSCILLO.S SELECTOR - DRAW- BARS DRAWBARS - 0 KEYCLICK - MAX VOL - MAX	Adjust to get 0.5V ~0.7V key click sound when a key is played.	VR-7	
	PERCUS GAIN	SIG OUT(Hi) - OSCILLO.S PERCUS VOL - MAX PERCUS DE- CAY - MAX PERCUSSION - 4' SELECTOR - DRAW- BARS DRAWBARS - 4'	Adjust so there is a 7:1~5:1 ratio between percussio 4' and drawbars 4'.	VR-8	
KLM-246	LFO (LOW)	ROTARY EFFE - FAST IC6-1 - f.counter	Adjust to obtain 145msec reading.	VR-6	
	LFO (HIGH)	IC6-7 - f.counter	Adjust to obtain 130msec reading.	VR-5	
	BIAS (LOW)	IC4-3-Digital	Adjust to obtain 6.00V reading.	VR-3	
	BIAS (HIGH)	IC1-3-Digital	Adjust to obtain 6.00V reading.	VR-1	
	AM-H		*	VR-2	

* The AM-H adjustment controls the high range volume fluctuation when the rotating speaker effect is turned on. Listen to the sound to confirm proper adjustment.

Trimmer positions (reference chart)



8. PARTS LIST

(Refer to structural diagram for parts list.)

PARTS NAME	SPECIFICATIONS	Q'TY	PARTS NAME	SPECIFICATIONS	Q'TY
CARBON RESISTORS (Not Listed)			CERAMIC CAPACITORS		
SOLID RESISTORS			561 (560 pF)		
1/4W 10MrJ			ECK-FIE104ZFZ (0.1 μF)		
METAL FILM RESISTORS			ELECTROLYTIC CAPACITORS		
1/4W 1.33 KμF			0.22μ / 50V		
6.81			0.47		
511			10 / 16		
750			100		
3.32			1000 / 6.3V		
3.92			220 / 16		
8.45			1000 / 6.3		
10			100 / 16		
20			2200 / 25		
30.1			22 / 16		
2.32			1 / 50		
2.26			10 / 16		
MYLAR CAPACITORS			TRANSISTORS		
50V 0.001μF k			2SC945 LK		
0.0012			2SC945		
0.0015			2SC1215T		
0.0022			2SC644R		
0.0027			2SC13849		
0.0033			2SA733AK		
0.0039			FET		
0.0047			2SK30		
0.0068			DIODES		
0.01			1S1555		
0.012			1S1885		
0.022			IC		
0.033			SM-304A		
0.047			SM-305A		
0.068			SM-305B		
0.082			NE-555		
0.16			S-50241		
0.056			MC-14069		
0.15			4458		
0.015			MC-14046		
0.039			MN-3004		
STYROL CAPACITORS			μPC 324		
47 pF G (5%)			14312 (7812)		
120 (1%)			SEMI-FIXED RESISTORS		
CERAMIC CAPACITORS			470ΩB H1051A		
ECK-D1H100 Dc (10 pF)			150		
120 K ₂ (12 pF)			10KB		
220 (22 pF)			220		
270 (27 pF)			1MB		
390 (39 pF)			100KB		
820 (82 pF)			1KB		
101 (100 pF)			KEYBOARD		
151 (150 pF)			ESK307V (61 key)		
221 (220 pF)			FUSE		
231 (330 pF)			250V 0.5A		
391 (390 pF)			LUG BOARD		
681 (680 pF)			L-1205-6P		
47 (47 pF)					

PARTS NAME	SPECIFICATIONS	Q'TY	PARTS NAME	PANEL INSTRUCTION	STANDARD
CONNECTORS			POTENTIOMETERS		
CX3-1 KO-131			VOLUME		
132			KEY CLICK		
121			TUNE		
122			OVER DRIVE		
123			BASS		
101			TREBLE		
91			PERCUS DECAY		
71			PERCUS VOL		
41			SLIDE VOLUME		
21			DRAWBAR x 9		
22			SELECT SWITCH		
92			SELECT x 8		
32			ROTARY KNOB		
TRC-1			Rotary knob (Large) 18φ		
100			Rotary knob (Small) for PS		
TOP ENTRY			DRAWBAR KNOB		
13P (B13P-SHF-1)			Drawbar knob 5-1/3'		
12 (B12P-SHF-1)			Drawbar knob 2-2/3'		
9 (B9B-SHF-1)			Drawbar knob 1-3/5' Brown		
3 (B3P-SHF-1)			Drawbar knob 1-1/3'		
2P (B2P-SHF-1)			Drawbar knob 16'		
BOTTOM ENTRY			Drawbar knob 8'		
10P (BE10P-SHF-1)			Drawbar knob 4'		
9 (BE9P-SHF-1)			Drawbar knob 2'		
7 (BE7P-SHF-1)			Drawbar knob 1'		
4 (BE4P-SHF-1)			Select knob (gray)		
3 (BE3P-SHF-1)			Select knob (Brown)		
PRINTED CIRCUIT BOARD			PHONE JACK		
(KLM244)			RETURN		
(KLM245)			OTHERS x 4		
(KLM246)					
BUSHING					
SR-6W-1					
POWER TRANSFORMER					
JA-221-12					
JB-221-12					
BUSHING					
4K-4					
5P-4					

CX-3

Service